

THE GENUS *ZORNIA* J. GMELIN (LEGUMINOSAE) IN AUSTRALIA

S.T. Reynolds and A.E. Holland

Queensland Herbarium, Meiers Road, Indooroopilly, Qld 4068

Summary

The genus *Zornia* J. Gmelin is represented by 17 species including 4 subspecies and 4 varieties in Australia. The identity of two additional taxa is uncertain. All species are described and notes and maps of their distribution appended. A key to distinguish them is provided. Eight new species viz *Z. acuta*, *Z. maritima*, *Z. disticha*, *Z. floribunda*, *Z. oligantha*, *Z. pedunculata*, *Z. prostrata* and *Z. ramosa*, two new subspecies *Z. muelleriana* subsp. *congesta* and *Z. muriculata* subsp. *angustata*, and one new variety *Z. prostrata* var. *macrantha* are described.

The new combination *Z. dyctiocarpa* var. *filifolia*, based on *Z. filifolia* Domin is made. Lectotypes are chosen for *Z. chaetophora* F. Muell., *Z. muelleriana* Mohl., *Z. stirlingii* Domin and *Z. filifolia* var. *adenophora* Domin. *Z. nervata* Mohl. is a synonym of *Z. albiflora* Mohl. The majority of plants previously identified as *Z. nervata* are included in *Z. prostrata*. *Z. gibbosa* Span. apparently does not occur in Australia; Australian collections formerly identified as such are included in *Z. disticha*.

Introduction

There has been much confusion in the genus *Zornia* in Australia, chiefly with plants in Queensland, and Mohlenbrock's monograph of the genus (Mohlenbrock 1961) has been found to be generally unsatisfactory and in some cases adds to the confusion. His descriptions of some species do not match the specimens he cited, or the type of a species name was from a different taxon from that described and specimens cited for it. In some cases, e.g. *Z. gibbosa* Span. he chose a lectotype when the type was still available for study, and his description does not cover that type. In the case of *Z. albiflora* Mohl. and *Z. nervata* Mohl., the types of the names were found to be from the same taxon, and his description of the latter species and the specimens cited do not agree with the nominated type.

There was also confusion in the *Z. filifolia* and *Z. adenophora* group. Mohlenbrock's concept of *Z. filifolia* is different from Domin's *Z. filifolia* and represents a new species (named *Z. ramosa* here). Confusion existed because Mohlenbrock did not cite types for *Z. filifolia* Domin and *Z. adenophora* (Domin) Mohl. and synonyms under it. He combined Domin's *Z. filifolia* var. *subeglandulosa* (= *Z. filifolia* var. *filifolia*) and *Z. filifolia* var. *adenophora* under *Z. adenophora* when they represent different species of plants. He probably did not see Domin's types, because under *Z. muriculata* he did not cite all its syntypes or give locality details of the types for *Z. diphylla* var. *hirsuta* Domin or *Z. diphylla* var. *xerophila* Domin.

The species vary greatly in the size and shape of leaflets, stipules and bracts, in occurrence of pellucid dots, in number of articles per fruit and in the presence or absence of bristles on the fruit. Some of these characters vary in the one population or within the one individual but the species nevertheless remains distinctive. Many species require further collections to ascertain their full range of variation.

Note: The revision of *Zornia* is part of the *Revision of the tribe Aeschynomeneae (Benth.) Hutch. in Australia*, funded by the Australian Biological Resources Study. A revision of the remainder of the tribe will be published in a future issue of *Austrobaileya*.

Taxonomy

Zornia J. Gmelin, Syst. Nat. 2: 1076, 1096 (1792). **Type:** *Z. bracteata* J. Gmelin

Derivation of name: After Johann Zorn, a German botanist and senator who wrote on rare plants and published illustrations of useful plants.

Erect or prostrate herbs usually with pellucid or pustular glands on stems, leaflets, stipules and bracts. Leaves alternate, petiolate, 2-4-foliolate (bifoliolate in Australia); leaflets

digitate; stipules well developed, paired, peltate, usually with a prominent basal spur, prominently nerved; stipels absent. Inflorescences spicate, terminal or axillary, rarely 1-flowered; bracts separated or overlapping, paired, stipule-like, peltate, enclosing flowers when in bud, prominently nerved. Flowers sessile. Calyx hyaline, ciliate, persistent, usually with a short tube and 5-lobed; tube \pm campanulate, prominently nerved, upper pair of lobes joined; lateral lobes smaller than other three. Corolla mostly yellow often streaked with orange, purple or red; petals all clawed; standard \pm rounded; wings subobovate, short, transversely plicate-rugose; keel incurved. Stamens monadelphous; upper part of tube circumciss at maturity and usually shed with petals; anthers unequal, alternately small and large. Ovary subsessile, with (2-)4-9 ovules. Fruits sessile, 2-9-jointed, separating into 1-seeded, indehiscent articles, or sometimes of only 1 article; included within persistent bracts or exserted; articles subsimilar, mostly quadrate, usually \pm compressed, reticulately veined and often with bristles or glands; bristles usually with short fine hairs; seeds mostly \pm oblongoid, pale or dark brown.

About 86 species widespread throughout the tropics and warm temperate areas; 19 species in Australia, eight new.

In some cases in the following key to species, it has been found necessary to use a combination of characters to distinguish the species because of their variability and because some characters, e.g. habit, are poorly known.

Note: Measurements of stipules and bracts include the basal spur, and the peduncles are measured to the base of the spike.

- | | |
|---|---------------------------|
| 1. Flowers solitary | 2 |
| Flowers 2-several in a spike, rarely solitary and then in combination with spikes on the same plant | 3 |
| 2. Leaflets linear, 0.5-1 mm wide. Fruits with hairy, bristly articles. Peduncles 1.2-2.5 cm long | 11. Z. ramosa |
| Leaflets ovate, 3-5 mm wide. Fruits glabrous, articles with a few short bristles or non bristly. Peduncles 3-4 cm long | 12. Z. pedunculata |
| 3. Bristles on fruits 3-5 mm long. Articles 3-5 mm long | 1. Z. chaetophora |
| Bristles less than 2 mm long. Articles less than 3.5 mm long | 4 |
| 4. Plants with conspicuous pellucid dots on leaflets; bracts, stems and stipules usually dotted | 5 |
| Plants epunctate or rarely with few obscure pellucid dots on leaflets (lower surfaces) and bracts | 14 |
| 5. Bracts (13-)16-24 \times (4-)6.5-8 mm, densely pellucid-dotted, overlapping. Leaflets (2.5-)4-6.5 cm long | 2. Z. stirlingii |
| Bracts 4-14 \times 0.5-6 mm, usually sparsely pellucid-dotted, overlapping or separated. Leaflets 0.8-3.8 cm long | 6 |
| 6. Leaflets usually pellucid-dotted on both surfaces. Stems, stipules and bracts also with pellucid dots | 7 |
| Leaflets only pellucid-dotted on lower surfaces. Stems, stipules and bracts occasionally with small obscure pellucid dots | 11 |
| 7. Stems erect | 8 |
| Stems prostrate or semiprostrate | 9 |
| 8. Leaflets 0.5-1 mm wide, usually linear, concave or flat. Fruits with 2-6, glabrous, conspicuously gland-dotted, non bristly articles | 3. Z. adenophora |
| Leaflets 1-2.5 mm wide, narrowly elliptic, flat. Fruits with 2-4, finely hairy, eglandular bristly articles | Z. sp. (1) |

9. Leaflets (18-)32-38 × 1.5-3 mm, 10-15 times as long as wide, drying black. Bracts ovate, 9-13.5 × 4-7 mm, overlapping or more or less separated. **4. *Z. acuta***
 Leaflets 8-33 × (1-)2-13 mm, usually less than 10 times as long as wide, not drying black. Bracts subobovate, elliptic or ovate, 4-11 × 1.5-5 mm, mostly separated 10
10. Bracts 4-7 × 1.5-4 mm, subobovate to elliptic, usually very separated (internodes to 3 times as long as bracts). Leaflets 1-5.5 mm wide, narrowly elliptic to linear oblong. Articles very bristly, glabrous or finely hairy **5. *Z. areolata***
 Bracts 7-14 × 2-7 mm, ovate or elliptic, overlapping half their length to separated. Leaflets 4-13 mm wide, ovate-oblong, elliptic to oblong. Articles usually with few bristles (mostly peripheral), or non bristly, glabrous or hairy **6. *Z. muelleriana***
11. Pellucid dots on leaflets and stems black. Inflorescences with distichous overlapping, narrowly elliptic bracts. Stems ascending **7. *Z. disticha***
 Pellucid dots on leaflets and stems not black. Inflorescences with overlapping or separated, ovate or elliptic bracts. Stems usually prostrate 12
12. Bracts to 2 mm wide, narrowly elliptic with a small spur at base, pellucid-dotted, prominently nerved. Fruits with 4 or 5, pale articles with reddish purple reticulation and bristles ***Z. sp.* (2)**
 Bracts 3-6 mm wide, ovate, usually with a conspicuous spur; pellucid dots sparse or absent; nerves prominent or indistinct. Fruits with 2-6, pale articles with pale reticulation 13
13. Leaflets 6-14 mm wide, ciliate, usually shiny and prominently reticulate below. Petioles 0.8-5.7 cm long. Bracts overlapping half their length to separated. **8. *Z. maritima***
 Leaflets 4-6.5 mm wide, neither ciliate nor shiny, mostly drying pale, with reticulate venation inconspicuous. Petioles 1.5-2 cm long. Bracts overlapping to about a quarter their length **13. *Z. pallida***
14. Stems erect 15
 Stems prostrate 17
15. Bracts 4-8 mm wide, broadly ovate, obtuse, prominently reticulate. Fruits hairy with hairy long bristles. Plants hairy **15. *Z. albiflora***
 Bracts 1-5 mm wide, narrowly elliptic to ovate, acute or acuminate, obscurely reticulate. Fruits glabrous or hairy; bristles long or short. Plants glabrous or hairy 16
16. Leaflets 26-40 × 1-2.5 mm (9-30 times as long as wide). Inflorescences 14-22 cm long, on peduncles 2.7-8 cm long. Bracts overlapping or nearly so, acute. Fruits 3-6-articulate, usually hairy with few usually peripheral bristles **10. *Z. floribunda***
 Leaflets (5-)7-32 × 0.5-9 mm (2-10 times as long as wide). Inflorescences 2.5-9.5(-15) cm long, on peduncles 0.3-1.5(-2.8) cm long. Bracts overlapping or widely separated, acuminate or acute. Fruits 1-4(-6)-articulate, usually glabrous, muriculate or covered with long bristles **9. *Z. muriculata***
17. Leaflets and bracts less than 2.5 mm wide 18
 Leaflets and bracts more than 3 mm wide 19

18. Inflorescences with 1–4 (rarely–10) very separated bracts. Fruits hairy with few small bristles or without bristles. Stipules not elongate, \pm falcate 14. *Z. dyctiocarpa*
 Inflorescences with (4–)7–20 very overlapping or \pm separated bracts. Fruits usually glabrous, with blunt or acute, small, short or long bristles. Stipules mostly elongate, \pm falcate, conspicuous 9. *Z. muriculata*
19. Leaflets less than 6 mm wide, lower ones usually smaller and broader than upper ones 20
 Leaflets 6.5–15 mm wide, lower ones rarely smaller than upper ones 22
20. Fruits (4–)6–9-articulate, glabrous rarely hairy; bristles usually absent. Bracts separated, ovate 14. *Z. dyctiocarpa*
 Fruits 1–5-articulate, glabrous or hairy; bristles present or absent. Bracts overlapping, especially towards the apex, ovate or elliptic 21
21. Leaflets pale; nerves not apparent. Bracts 5–6 mm wide, acute. Fruits with hairy articles and many hairy bristles; articles 2–3 \times 3–3.5 mm. Stipules 8.5–10 cm long, not elongate or \pm falcate 13. *Z. pallida*
 Leaflets not pale, usually with prominent lateral nerves. Bracts 2–3(–4) mm wide, acuminate. Fruits usually glabrous; bristles few or absent; articles 2–3 \times 1.5–2.5 mm. Stipules (7–)10–14 mm long, usually elongate \pm falcate 9. *Z. muriculata*
22. Fruits hairy; articles 2–3.5 mm long, eglandular, prominently reticulate veined and with conspicuous, hairy bristles. Inflorescences (4–)8–21-flowered; bracts prominently reticulate. Leaflets usually broadly ovate, elliptic or obovate, obtuse 16. *Z. prostrata*
 Fruits glabrous; articles 1.5–2 mm long, glandular-dotted, obscurely reticulate veined, with small bristles, mostly at periphery, or bristles absent. Inflorescences 2–8(–12)-flowered; bracts obscurely reticulate. Leaflets ovate, acute 17. *Z. oligantha*

1. *Zornia chaetophora* F. Muell., Trans. & Proc. Philos. Inst. Vic. 3: 56 (1858). Type: Western Australia. Sturt Creek, February 1856, *F. Mueller* (lecto (here designated): K; iso: MEL(MEL 1544961)).

Z. diphylla var. *conjugata* subvar. *perglandulosa* Domin, Biblioth. Bot. 89: 209 (1926). Type: Northern Territory. Victoria River, *F. Mueller* (holo: *n.v.*, iso: MEL(MEL 1544961)).

[*Z. diphylla* var. *gracilis* auct. non (DC.) Martius: Bentham, Fl. austral. 2: 229 (1864), quoad specimen Sturt Creek, *F. Mueller*.]

Herbs to 75 cm high, with erect, much-branched, glabrous or subglabrous stems. Stems, leaves, stipules and bracts with dense reddish or pale brown ellipsoid or globose glands. Petioles 4–13 mm long; leaflets variable, ovate, elliptic, linear oblong or narrowly elliptic, 1.5–4 cm long, 1–6(–10) mm wide, lower ones usually smaller and broader than upper ones, apex acute or mucronate, base obtuse or acute, margins rarely ciliate; midrib prominent; petiolules to 1 mm long. Stipules subrhombic, usually subfalcate, 6–13 \times 1–5 mm, attenuate or acuminate at apex, produced into a narrow spur at base, 5–7-nerved; reticulate venation obscure; spur acuminate, 2–6 mm long. Inflorescences 7–25 cm long, 3–9-flowered, with very widely separated bracts; peduncles to 10 cm long, punctate; bracts narrowly ovate or elliptic, 6–10 \times 1.5–3 mm, acute, with broad or narrow spur at base, glabrous or puberulent, ciliate, 5-nerved; reticulate venation obscure; spur 1–2.5 mm long, acute, truncate or obtuse. Calyx 3–4 mm long; petals yellow; standard 6–8 mm long. Fruits 1–5-articulate, exserted; articles broadly elliptic or \pm obovate, concave above, 3–5(–7) \times 2–2.5 mm, prominently reticulate veined, eglandular, glabrous, ciliate, or puberulent, covered with long, filiform, patent-hairy bristles; bristles 3–5 mm long.

Selected specimens: Western Australia. Near Derby Airport, 8 km S of Derby, Apr 1985, *Aplin et al.* 32 (PERTH); Derby Pindan Block, Aug 1973, *Holm* 27 (PERTH); Junction of Gupungi and Cable Beach roads, Broome, Aug 1985, *Kenneally* 9431 (CANB,PERTH); Great Sandy Desert, Bruces Field, May 1982, *Harris* 48 (AD); Sturt Creek, Feb 1856, *Mueller* [MEL 1544961] (K.MEL). Northern Territory. Victoria River, *Mueller* [MEL 1544961] (MEL); SSE of mouth of Daly River, Jul 1946, *Blake* 16663 (BRI,CANB,NT); Creek Crossing, 3 miles [4.8 km] S of Litchfield homestead, May 1964, *Robinson* R362 (NT); 5 miles [8 km] W of Wangi homestead, Aug 1969, *Byrnes* 1674 (CANB,NT); Fish River Stn, Aug 1983, *Silversteen* 911 (DNA); Port Keats, Sep 1972, *Robinson* [NT37493] (DNA,NT); 30 miles [48 km] S of Borroloola, Mar 1972, *Byrnes* 2541 * (CANB,DNA); 5 miles [8 km] S of Elliott, Stuart Hwy, Feb 1969, *Must* 462 (BRI,CANB,NT); 45km N of Renner Springs, Jul 1974, *Carr* 46357 & *Beaglehole* 46379 (NT); Murchison Range area, Apr 1983, *Latz* 9699 (NT); 24 km S of Soudan homestead on Annitowa Rd, May 1977, *Henshall* 1791 (AD,BRI,CANB,NT). [* Byrnes 2541 has shorter bristles (1.5–2 mm long) on the loment than is usual for the species but is otherwise typical.]

Distribution and habitat: This species occurs in north Western Australia (from the Kimberleys to the Great Sandy Desert) and in Northern Territory (around Fish River and Victoria River, and as far south as the Murchison Range) (Map 8); occurs mainly in sandy or loamy soil on red sandstone plains, in shrubland, eucalypt woodlands or disturbed areas.

This species differs from all the other species occurring in Australia in the large articles (3–7 × 2–2.5 mm) and long (3–5 mm long) patent-hairy bristles. Leaflets are also long (to 4 cm) and densely pellucid-dotted.

Typification: The Kew sheet is chosen as a lectotype because it is part of the original material and is a better specimen than the ones at MEL. Moreover the MEL sheet (MEL 1544961) consist of three specimens, all of this species, and carries two labels with different localities viz Sturt Creek, Feb 1856, *F. Mueller*, and Victoria River, Jan 1856, *F. Mueller*.

2. *Zornia stirlingii* Domin, *Biblioth. Bot.* 89: 210, t. 25, f. 1–4 (1926). **Type:** Queensland. COOK DISTRICT: in xerodrymio ad pedem colles, calcifer Bluff prope opp Chillagoe, February 1910, *Domin* (lecto (here designated): PR(PR 527338); isolecto: PR(PR 527339)).

Z. diphylla var. *stirlingii* Bailey, *Queensland Agric. J.* 15: 491 (1904). **Type:** Queensland. COOK DISTRICT: Herberton, June 1904, *J. Stirling* (holo: BRI).

Tall, robust or spindly, glabrous herbs to 1 m high with thick, erect, few-branched stems. Leaflets, stipules and bracts with reddish brown or pale brown pellucid dots, dense on leaflets, stipules and bracts, fewer on stems, petioles and peduncles. Petioles 0.5–2.2 cm long; leaflets narrowly elliptic-ovate or linear, (2.5–)4–6.5 cm long, 1.5–4(–5.5) mm wide, acute or acuminate at apex, acute at base; petiolules 0.5–0.7 mm long. Stipules narrowly elliptic or subrhombic, 10–20 × 1.5–3 mm, acuminate at apex, with a long narrow spur at base, 5-nerved; reticulate venation obscure; spur 5–7 mm long, acuminate. Inflorescences 11–21 cm long, densely flowered with bracts crowded and overlapping especially towards apex; peduncles to 10 cm long; bracts broadly elliptic or ovate, (1.3–)1.6–2.4 × 0.4–0.8 cm, acute at apex, with a short broad spur at base, ciliate, 5–7-nerved; reticulate venation prominent; spur acute or obtuse, 1–5 mm long. Calyx 4–5 mm long; petals yellow; standard 7–11 mm long. Fruit 2–7-articulate, exserted or included; articles 2.5–3 × 2–3 mm, with reddish brown reticulate venation, eglandular, puberulent, densely covered with fine, retrorse hairy bristles especially at the periphery; bristles 0.5–2 mm long.

Selected specimens: Queensland. COOK DISTRICT: 7 km from Kennedy River crossing on the Fairview–Kimba Rd. on track to King River Outstation, Apr 1980, *Clarkson* 3232 (BRI); Mt Molloy, Apr 1932, *Brass* 2470 (BRI); Chillagoe, Feb 1910, *Domin* (PR); 7 km W of Rockwood Ck on the Burke Development Rd, Mar 1980, *Clarkson* 3002 (BRI); Stannary Hills, May 1909, *Bancroft* 514 (BRI); Parada, 20 miles [32 km] SW of Mareeba, Apr 1962, *McKee* 9358 (BRI); Herberton, Jun 1904, *Stirling* (BRI); southern slopes of Mt Masterton, Jan 1960, *Goodall* [AQ239526] (BRI); Springmount Stn, ca 13 km from the Mareeba–Dimbulah Rd, on the road to Collins Weir, Apr 1983, *Clarkson* 4630 (BRI); Montalbon on Petford–Herberton Rd, Apr 1962, *McKee* 9429 (BRI); Lappa, Jan 1982, *Pedley* 4840 (BRI,CANB); Bullock Ck, Feb 1922, *White* 1350 (BRI); Etheridge River, without date, *Armit* 913 (MEL). NORTH KENNEDY DISTRICT: Christmas Creek Stn, 120 miles [192 km] NW of Charters Towers, Mar 1971, *Compton* 89 (BRI); Mt Saunders about 1.5 miles [2.4 km] NW of Yabula, Aug 1942, *Smith* T.118 (BRI).

Distribution and habitat: So far known only from north eastern Queensland (Map 8); occurs mostly on rock or grassy hillslopes in eucalypt woodlands usually near creeks and drainage lines.

The large (1.3–2.4 cm long) overlapping bracts and the densely pellucid-dotted leaflets, stipules and bracts distinguish this species from other Australian species.

Typification: This plant was described as *Z. diphylla* var. *stirlingii* by F.M. Bailey in 1904. K. Domin specifically described it as a new species in 1926, included Bailey's *Z. diphylla* var. *stirlingii* in the synonymy and took up the epithet "stirlingii" for it. He was not, however, making a new combination of Bailey's name. Domin's description was based principally on his own collections, though he cited also the type of Bailey's name with his protologue. He indicated, however, that he had not seen it. His protologue also included the illustration in Bailey's Comprehensive Catalogue (Bailey 1913). PR 527338 and PR 527339 from Domin's original collections are chosen as lectotype and isolectotype as the rest of the specimens are inadequate.

3. *Zornia adenophora* (Domin) Mohl., *Webbia* 16: 50, f. 33 (1961); *Z. filifolia* var. *adenophora* Domin, *Biblioth. Bot.* 89: 211 (1926). **Type:** Queensland, NORTH KENNEDY DISTRICT: in monte Mt Remarkable prope opp Pentland, February 1910, *Domin* (lecto (here designated): PR(PR 527344)).

Z. diphylla var. *filifolia* Bailey, *Bot. Bull.* 3: 10 (1891). **Type:** Queensland, COOK DISTRICT: Walsh River, March 1891, *T. Barclay Millar* (holo: BRI).

Glabrous herbs to 50 cm high, with erect much-branched, sparsely pellucid-dotted stems. Leaflets, stipules, bracts and fruits usually with dense, ellipsoid, reddish or brown glands. Petioles 0.4–1.3 cm long; leaflets linear-oblong, 1–3.4 cm long, 0.5–1 mm wide, acute or mucronate at apex, acute at base, flat or concave; midrib prominent; petiolules to 0.5 mm long. Stipules narrowly ovate, elliptic or subrhombic, 2–3.5 × 0.5–1 mm, acute or acuminate at apex, usually with a short spur at base, 3-nerved; reticulate venation obscure; spur 0.5–1.5 mm long, acute. Inflorescences 3.5–10.5 cm long, 5–13-flowered, with usually very widely separated bracts (internodes 2–3 times as long as bracts); peduncles glabrous, to 3 cm long; bracts narrowly elliptic, often falcate, 3–5 × 0.5–1.5 mm, acute at apex, shortly spurred at base, rarely ciliate, 3–5-nerved; nerves pale; reticulate venation obscure; spur 0.5–1 mm long, acute or toothed. Calyx 2–3.5 mm long; petals yellow-orange; standard 5–6 mm long. Fruit (2–)4–6-articulate, exserted; articles 1.5–2 × 1–2 mm, glabrous, usually prominently reticulate veined, covered with large glands; bristles absent.

Selected specimens: Northern Territory. Calvert River, Jun 1987, *Thompson* 1867 (NT). Queensland. BURKE DISTRICT: Almaden, Jun 1907, *Blackman* [AQ239371] (BRI); Westmoreland Stn, 145 km WNW of Burketown, May 1974, *Pullen* 9193 (CANB); 23 km NW of Old Corinda Outstation along Doomadgee to Westmoreland road, May 1974, *Pullen* 9115 (CANB); ca 9 km SW of Normanton, on road to Cloncurry, Apr 1973, *Henderson* H1807 (BRI); 100 km from Georgetown on Normanton Rd., Apr 1975, *Craven* 3316 (BRI,CANB,MEL); 64 km from Georgetown on Croydon Rd, Mar 1988, *Forster* 3840 (BRI); COOK DISTRICT: Tate River, undated, *Armit* 537 (MEL); 3 miles [4.8 km] E of Mareeba, May 1959, *Thorne* 21136 & *Jones* (BRI); Einasleigh River, undated, *Armit* 916 (MEL). NORTH KENNEDY DISTRICT: near source of Poisson Ck, about 90 miles [144 km] N of Hughenden, Apr 1935, *Blake* 8556 (BRI,CANB); Warrigal, on Great Dividing Range, Feb 1931, *Hubbard & Winders* 7101 (BRI); Mt Remarkable, Pentland, Feb 1910, *Domin* (PR); 36 km E of Torrens Ck, Charters Towers Rd, Jun 1984, *Hacker* 693 (BRI). SOUTH KENNEDY DISTRICT: near junction of Campaspe and Cape Rivers, Apr 1945, *Blake* 15739 & *Webb* (BRI,CANB).

Distribution and habitat: Gulf of Carpentaria and northern Queensland extending south to Pentland (Map 7); occurs in sandy soils in open forests and grassland, on flood plains and in disturbed areas.

The glandular articles distinguish this species from all other Australian species. It is allied to *Z. areolata* and *Z. dyctiocarpa* var. *filifolia*; it differs from the former in its erect habit and more narrow leaves and bracts, and from the latter in its densely glandular foliage and glandular fruits.

Typification: Prague sheet PR 527334 is chosen as the lectotype as it is the only sheet of the original material that agrees with the original description. See also discussion under *Z. ramosa* below.

4. *Z. acuta* S. Reyn. & Holland **species nova** a speciebus Australianis ceteris foliolis elongatis angustatis, bracteis latis ovatis, stipulis elongatis, acuminatis differt. **Typus:** Northern Territory. Shoal Bay Road Darwin, 2 February 1961, *H.S. McKee* 8377 (holo: BRI; iso: NT).

Herbs with ± prostrate, glabrous, obscurely and sparsely pellucid-dotted stems. Petioles (0.8–)1.3–1.5 cm long; leaflets narrowly elliptic, (1.8–)3.2–3.8 cm long, 2–3 mm wide, acute to acuminate and mucronate at apex, subacute at base, glabrous, pellucid-dotted;

petiolules to 1 mm long. Stipules narrowly elliptic, (8-)12-17 × 1.5-3 mm, acuminate at apex, prominently spurred at base, 3-5-nerved, glabrous, pellucid-dotted, reticulate venation prominent; spur 2-4.5 mm long, acute, acuminate, obtuse or truncate. Inflorescences 4-11 cm long, 3-8-flowered with overlapping or ± separated bracts (internodes to 1.5 times as long as bracts); peduncles 2-4 cm long; bracts broadly ovate, 9-13.5 × 4-7 mm, acute at apex, 5-nerved, glabrous, conspicuously reticulate veined, sparsely pellucid-dotted. Flowers not seen. Fruits (immature) 1-5-articulate, included; articles glabrous or hairy, gland-dotted; bristles to 1 mm long, hairy or glabrous.

Selected Specimens: Western Australia. Gibb River, Jan 1951, *Gardner* 9942 (PERTH). Northern Territory. Shoal Bay Rd, Darwin, Feb 1961, *McKee* 8377 (BRI,NT).

Distribution and habitat: North-western Australia (**Map 13**): known only from the above collections.

Z. acuta differs from all the Australian species with elongate narrow leaflets, in the broad ovate bracts, and elongate acuminate stipules. It is closely allied to *Z. areolata* differing chiefly in its long narrow leaflets.

Etymology: The specific epithet refers to the acute leaflets and bracts.

5. *Zornia areolata* Mohl., *Webbia* 16: 53, f. 35 & 36 (1961) **Type:** Queensland. BURKE DISTRICT: Creen Creek, *Gulliver* s.n. (holo: MEL, *n.v.*; iso: MEL(MEL 1544960)).

Herbs with prostrate, spreading, much-branched, reddish, sparsely hairy to glabrous stems to 1 m long. Leaflets, stipules and bracts with conspicuous reddish or dark glands. Petioles 4-18 mm long, puberulent or glabrous; leaflets narrowly oblong or elliptic to linear, 0.8-2.5 cm long, (1-)2-3.5(-5.5) mm wide, acute or obtuse and mucronate at apex, obtuse at base, glabrous or lower surface subglabrous; petiolules to 0.5 mm long. Stipules narrowly ovate or subrhombic, 2-7 × 1-2 mm, acuminate at apex, shortly spurred at base, 3-5-nerved; reticulate venation obscure; margins pale; spur to 1.5 mm long, acute, obtuse or toothed. Inflorescences 2-5.5 cm long, (1-)2-6-flowered, with separated bracts (internodes to 3 times as long as bracts); peduncles filiform, 1-4.5 cm long; bracts broadly subobovate or elliptic, 4-7 × 1.5-4 mm, obtuse or subacute at apex, suboblique, with narrow spur at base, ciliate, 5-nerved; nerves pale, with fine distinctive reticulate venation; spur 0.5-1 mm long, acute, obtuse or toothed. Calyx 2-3 mm long; petals orange-yellow; standard 6-8 mm long. Fruit 2-5-articulate, exerted, crenate on lower margins; articles ± obovate, concave above, or oblong, 2-3 × 1.5-2 mm, conspicuously reticulate veined, eglandular, puberulent or subglabrous, covered with fine glabrous bristles; bristles to 1 mm long.

Selected Specimens: Northern Territory. Near Knucky Lagoon, Nickson Place, Apr 1956, *Burbidge* 5106 (BRI); Batchelor, Mar 1963, *Muspratt* SSO100 (NT); Yam Ck, near Brocks Ck 130 km SSE Darwin, Jan 1883, *Foelsche* 41 (AD,K,MEL); Pine Ck, Apr 1904, *Niemann* (MEL); 3 miles [4.8 km] N of Hays Ck, Apr 1969, *Byrnes* 1535 (BRI); Near Douglas River, Apr 1967, *Robinson* CSR16 (NT); 1/2 mile [ca 1 km] NW of Edith River Crossing, Jan 1965, *Wilson* 210 (NT); Katherine Gorge National Park, Apr 1977, *Dunlop* 4493 (NT); Queensland: Cook DISTRICT: Newcastle Bay, May 1948, *Brass* 18678 (BRI); 0.8 km S of Laura River crossing on the Peninsula Development Rd, Mar 1987, *Clarkson* 6800 & *McDonald* (BRI); Einasleigh-Forsayth Rd, Jul 1983, *Hacker* 359 (BRI). BURKE DISTRICT: Between Norman and Gilbert Rivers, in 1874, *Gulliver* 57 (MEL); Westmoreland Stn, May 1976, *Pullen* 9193 (BRI). SOUTH KENNEDY DISTRICT: Yarromere, 100 miles [160 km] SSW of Charters Towers, Apr 1969, *Walker* [AQ239374] (BRI). LEICHHARDT DISTRICT: Marylands stn, head of Connor's River, Apr 1962, *Hinton* [AQ239431] (BRI).

Distribution and habitat: Northern Northern Territory (Darwin to Katherine Gorge) to northern and central Queensland (**Map 9**); occurs in sandy or gravelly soils in open forests, creek banks, red soil flats, slopes of granite outcrops.

Z. areolata is usually a slender-looking plant with prostrate slender stems, narrow pellucid-dotted leaflets and usually small, very separated subobovate or elliptic bracts. The peduncles of some plants also tend to be zig-zag. The species varies in hairiness and inflorescences, e.g. plants from Queensland tend to be more hairy with broader leaflets and bracts while those from Katherine (N.T.) are ± glabrous with small bracts and very narrow leaflets.

Typification: We were not able to locate the holotype at MEL. A collection (at MEL), from between Norman and Gilbert Rivers, in 1874 by *Gulliver*, (*Gulliver* 57), was

probably collected at Creen Creek and is probably an isotype. It agrees with the protologue and illustration of the holotype.

Note: Mohlenbrock (l.c.) cites *Z. diphylla* var. *conjugata* subvar. *perglandulosa* Domin, Biblioth. Bot. 89: 209 (1900) as a synonym of *Z. areolata*, but this plant from Upper Victoria River, N.T., F. Mueller (photos BRI), is *Z. muelleriana* subsp. *congesta*, which occurs in the area.

6. *Zornia muelleriana* Mohl., *Webbia* 16: 131, f. 89 (1981). **Type:** Queensland. COOK DISTRICT: Walsh, March 1891, T. Barclay Millar (lecto (designated here): BRI(AQ022928, excluding pieces of *Z. muriculata* indicated as such)).

Herbs with prostrate or semi-prostrate, laxly branched, densely hairy to glabrous, pellucid-dotted stems 12.5–44 cm long. Stems, leaflets, stipules, bracts and petioles pellucid-dotted with dense conspicuous yellow to darkish glands, rarely sparsely pellucid-dotted. Petioles 8–16 mm long; leaflets ovate, elliptic, ovate-oblong or subobovate, (0.8–)1.4–3.3 cm long, 4–13 mm wide, lower ones usually smaller and broader than upper ones; apex acute or obtuse, rarely ± truncate or retuse, base obtuse and oblique, both surfaces conspicuously pellucid-dotted, hairy or glabrous; lateral nerves usually conspicuous; petioles to 1 mm long, pilose. Stipules narrowly elliptic or rhombic, (3–)5–7 × 1.5–2 mm, acuminate or acute at apex, usually narrowly spurred at base, 3–8-nerved, glabrous, reticulate venation obscure; spur 1–2.5 mm long, obtuse, acuminate or truncate. Inflorescences 5–25 cm long, (2–)5–27-flowered with bracts overlapping (towards apex) to separated, especially towards base (internodes 0.5–3 times as long as bracts); peduncles 1.5–10.5 cm long; bracts elliptic, ovate or nearly suborbicular, 7–14 × 2–7 mm, 3–6-nerved, ciliate, prominently reticulate veined and gland-dotted; spur 1–2.5 mm long, acute, obtuse or truncate. Calyx 3.5–4 mm long; petals yellow, pinkish or red; standard 6–7 mm long. Fruits (1–)2–5-articulate; articles 1.5–2.5 × 1.5–3 mm, usually pale with conspicuous reddish brown reticulate venation, glabrous or sometimes finely hairy, ciliate, sparsely gland-dotted, bristly (mostly at periphery) or rarely non bristly; bristles up to 2 mm long, usually hairy especially near the tip.

Z. muelleriana Mohl. is characterised by the usually densely pellucid-dotted leaflets, stems, stipules and bracts; the ovate, elliptic or ovate-oblong and pellucid-dotted (on both surfaces) leaflets; the inflorescences with usually overlapping to separated bracts, and by the fruits with mostly whitish or pale coloured articles which have reddish reticulate venation, few small glands and weak bristles. Some forms of this species resemble some forms of *Z. prostrata* with obscure scattered pellucid dots but the petioles are short in *Z. muelleriana* and long (longer than leaflets) in that species.

Typification: When Mohlenbrock described *Z. muelleriana* he did not indicate either in the publication or on the specimen which of the two collections of Barclay Millar (December 1890 or March 1981) was the holotype. The above collection is selected as lectotype because it is a better specimen and agrees with the original description. The sheet it is mounted on also includes small pieces of *Z. muriculata* which have been indicated as such.

Leaflets, bracts, hairiness and number of glands in *Z. muelleriana* are all very variable. Two subspecies are recognisable as follows.

Bracts elliptic or ovate, 7–11.5 × 2–5(–7)mm, overlapping by one-third their length near apex, separated near base. Peduncles 1.5–10.5 cm long. Leaflets acute or obtuse at apex. Stems sparsely hairy to glabrous subsp. **muelleriana**

Bracts broadly ovate to suborbicular, 8–14 × 3–7 mm, overlapping by about half their length throughout. Peduncles 2–2.5 cm long. Leaflets obtuse, retuse or ± truncate at apex. Stems hairy subsp. **congesta**

Z. muelleriana Mohl. subsp. **muelleriana**

Distinguishing characters are as set out in the key above.

Stems ± densely gland-dotted, usually sparsely antrorse hairy. Leaflets mostly oblong-

ovate to elliptic or oblong, obtuse or acute at apex, glabrous or hairy, densely pellucid-dotted (rarely with only a few dots); lateral nerves usually conspicuous.

Selected specimens: Queensland. COOK DISTRICT: Walsh, Mar 1891, *Barclay Millar* (BRI); Mt Molloy, Apr 1962, *McKee* 9122 (BRI); Southedge Stn, Yaikula, Feb 1978, *Anning* 269 (BRI); Gilbert River, *Bick* (BRI); Parada Research Station, 32 km NSW of Mareeba, Mar 1975, *Staples* 2018 (BRI). NORTH KENNEDY DISTRICT: 2 km N of Fletcher Ck, about 40 km NW of Charters Towers on Lynd Rd, Jul 1983, *Hacker* 338 (BRI); Range View, S.E. of Ravenswood, May 1954, *Everist* 5528 (BRI). SOUTH KENNEDY DISTRICT: Collinsville, Mar 1984, *Thompson* [AQ 440712] (BRI); Lou Lou Park Stn, about 50 km N of Jericho, Feb 1984, *Cheffin* 71 (BRI). PORT CURTIS DISTRICT: Fitzroy River near Rockhampton, Jan 1961, *Howard* [AQ239427] (BRI). LEICHHARDT DISTRICT: Burton Downs, May 1982, *Johnson* 2338 (BRI).

Distribution and habitat: *Z. muelleriana* subsp. *muelleriana* is known only from Queensland (from near the Gilbert River to near the Fitzroy River) (**Map 1**); occurs usually in sandy or rocky soil on sandy ridges or creek levees, in open eucalypt forests.

Subspecies *muelleriana* is very variable with at least three distinctive forms as indicated below. They are not formally recognised here because of the presence of intermediate forms and also because their distributional ranges overlap. Plants from around Gilbert River are typical. They have densely gland-dotted stems, leaves, stipules and bracts, and stems glabrous or nearly glabrous. Plants from the Atherton Tableland, near Ravenswood and Suttor River are mostly with hairy stems, leaflets and bracts. This form resembles subspecies *congesta* but differs from it in its separated smaller narrower bracts. Some plants of this form are intermediate between this species and *Z. prostrata* e.g. Herbert River, *Dallachy* (MEL); Mareeba, *Pedley* 2254 (BRI), and *Blake* 13476 (BRI); 85 km from Lynd, Einasleigh–Forsayth Rd, *Hacker* 351 (BRI) (**Map 12**). They have similar leaflets to those of *Z. prostrata* with prominent nerves and also prominently reticulate veined bracts. They are tentatively retained under *Z. muelleriana* subsp. *muelleriana* because of the pellucid-punctate leaflets. Further collections are necessary to ascertain relationship of these plants. Besides the above forms, a group of plants from around Townsville to Fitzroy River area has fairly large, ± showy inflorescences with separated small bracts and hairy fruits, and resembles *Z. disticha*. However, in that species the inflorescence has congested distichous bracts. Further collections of this taxon may show it warrants recognition as a distinct variety or subspecies.

***Zornia muelleriana* subsp. *congesta* S. Reyn. & Holland subsp. nov.** a subsp. *muellerianae* bracteis congestis plerumque latioribus et pedunculis inflorescentiarum brevioribus (2–2.5 cm longis) differt. **Typus:** Western Australia. Great Northern Highway, 200 km north of Hall's Creek along road to Kununurra (16°45'S, 128°17'E), 25 April 1985, *Aplin et al.* 393 (holo: PERTH).

Distinguishing characters are as set out in the key above.

Stems, leaves, stipules and bracts densely hairy and pellucid-dotted with conspicuous yellowish glands. Leaflets elliptic, broadly ovate-oblong or subobovate, obtuse, ± truncate or retuse at apex; lateral nerves conspicuous.

Selected specimens: Western Australia. Carr Boyd Ranges bordering Lake Argyle, Mar 1978, *Hartley* 14558 (CANB,NT,PERTH); Smoke Ck, SW of Lake Argyle, Apr 1980, *Weston* 12085 (PERTH); Kimberley, Meda–Oobagooma Rd, 80 km by road N of Gibb River Rd, 70 km NE of Derby, Jun 1976, *Beaglehole* 52761 (PERTH); Derby–Broome Rd, 19.6 km S of Derby, Apr 1985, *Aplin et al.* 63 (PERTH); Beagle Bay Mission, Dampier Peninsula, Mar 1985, *Martin* 14 (PERTH); Head of Breadon Valley, South Esk Tableland, Apr 1979, *George* 15488 (NT,PERTH); Great Northern Highway, 200 km N of Halls Ck along Rd to Kununurra, Apr 1985, *Aplin et al.* 393 (PERTH). Northern Territory: Victoria River, Dec 1855, *Mueller* (MEL); 130 km W of Timber Ck, Victoria Highway, Sep 1974, *Parker* 476 (CANB,DNA,NT).

Distribution and habitat: From the Kimberleys, Western Australia to Victoria River area, Northern Territory (**Map 1**); occurs usually in sandy soil, on sand plains, low lying areas and also near creeks, usually amongst grasses and herbs.

Subspecies *congesta* is distinguished from the typical subspecies by the overlapping bracts, short peduncles and densely hairy, gland-dotted stems, leaves, bracts and stipules. The bracts vary greatly; some plants have wide bracts similar to those of *Z. albiflora* Mohl. e.g. *Royce* 6892 (PERTH) from Mt Anderson Station, but *Z. albiflora* differs in the erect or ascending stems and the punctate or rarely sparsely dotted bracts.

Etymology: The subspecific epithet refers to the congested bracts.

7. *Zornia disticha* S. Reyn. & Holland **species nova** ad *Z. muellerianam* Mohl. foliolis et caulibus glanduloso-punctatis accendens, autem caulibus plerumque erectis, bracteis distichis congestibus et leguminibus puberulis differt. **Typus:** Northern Territory. Night Cliff, Darwin, (12°22'S, 130°53'E), 24 March 1948, *R.L. Specht* 43 (holo: BRI; iso: AD, MEL).

[*Z. gibbosa* auct. non Span.: Mohl., *Webbia* 16: 112–113 (1961) quoad specimina Australiensia et decriptionem pro parte.]

Herbs to 30 cm high with laxly branched, usually ascending, glabrous or sparsely antrorse hairy, and sparsely pellucid-dotted (with black glands) stems. Petioles (0.8–)1.4–2 cm long, glabrous or subglabrous; leaflets narrowly elliptic or oblong, (1–)1.4–2.5 cm long, 2.5–6.5 mm wide, subacute or obtuse and mucronate at apex, suboblique at base, glabrous, usually with black or dark brown pellucid dots on lower surfaces and margins; lateral nerves obscure; petiolules 0.5–1 mm long, pilose. Stipules narrowly elliptic or rhombic, 6–9 × 1–2 mm, acuminate at apex, with narrow spur at base, 3-nerved, pellucid-dotted; spur to 2 mm long. Inflorescences 2.5–13 cm long, 6–25-flowered, with flowers densely clustered and with distichous overlapping bracts (bracts overlap half to one-third their length); peduncles 5–14 mm long; bracts narrowly elliptic, 7.5–12 × 3–4 mm, with small ovate spur at base, 5-nerved, pellucid-dotted (with yellow dots), glabrous except for ciliate margins; spur 1–2 mm long. Calyx 2–3 mm long; petals yellow; standard 4–5 mm long. Fruits (2- or)3- or 4-articulate, included; articles 2 × 1.5 mm, hairy, usually with prominent dark reticulate venation and hairy bristles, sparsely gland-dotted; bristles 0.5–1 mm long, retrorse-hairy.

Specimens examined: Papua New Guinea, exact locality unknown, *Brass* 1186 (BRI), Northern Territory. Night Cliff, Darwin, Mar 1948, *Specht* 43 (AD, BRI, MEL); East Point Reserve, Darwin, 12°24'S, 130°49'E, Mar 1979, *Rankin* 1846 (CANB, DNA).

Distribution and habitat: Known only from the collections cited (**Map 10**); occurs usually in sandy lateritic soil along the beach and in disturbed areas.

Z. disticha can be distinguished from other related species by the black dots on stems and lower surface of leaflets, by the showy usually densely flowered inflorescences with distichous congested bracts and by the hairy fruits with hairy bristles. It is related to *Z. muelleriana* Mohl. in the pellucid-dotted leaves and stems, but differs chiefly in the usually dark or black dots, congested bracts and ascending stems.

Note: *Z. disticha* includes plants from Australia previously included under *Z. gibbosa* Span. by Mohlenbrock (l.c.). The type of *Z. gibbosa* Span. is from Koepang (Kupang) Timor, *Spanoghe*, at L, yet when Mohlenbrock wrote up the species in his monograph, he selected a neotype, namely *Thorel* 1426 (NSW, US) from Cai Cong, Cochinchina, collected between 1862–66. His description of *Z. gibbosa* matches his neotype and agrees quite well with the Australian plants and some of the Asian collections, e.g. *Merrill* 3787 (NSW), and *Clemens* 12476 (AD) from Philippines, and *Mokin* 805 (NSW) from Burma, but does not agree with the type or the original description of *Z. gibbosa*, or that of *Z. graminea* Span. from Timor, *Spanoghe*, at L which he synonymised under *Z. gibbosa*. *Z. disticha* and the above Asian plants are distinguishable from *Z. gibbosa* as follows:

Leaflets broadly elliptic or subovate; apex broad, ± rounded. Inflorescences to 8-flowered; bracts broad, ± separated	Z. gibbosa
Leaflets narrowly elliptic or oblong; apex subacute to obtuse and mucronate. Inflorescences 6–25-flowered; bracts narrow, congested	Z. disticha
	(and Asian plants cited above)

The Asian collections, although superficially similar to *Z. disticha*, differ in having larger leaflets, stipules and bracts (the latter becoming membranous with age as in *Z. prostrata* and *Z. albiflora*).

Because of the differences of *Z. disticha* from the type of *Z. gibbosa* Span. and Asian collections of that species, and also from the type of *Z. graminea* Span., we have decided to keep it distinct from *Z. gibbosa*.

8. *Zornia maritima* S. Reyn. & Holland **species nova** propter flores, folia et legumina *Z. prostratae* S. Reyn. & Holland proxima autem praecipue floribus bracteis et stipulis grandioribus (circa duplo grandioribus) et plerumque foliolis manifeste nervaturis reticulatis in pagina infera \pm nitentibus differt. **Typus:** Queensland. COOK DISTRICT: Lizard Island, 29 September 1988, *G.N. Batianoff* 10143 (holo: BRI; iso: BRI).

Herbs with prostrate, glabrous, epunctate stems 17–60 cm long. Petioles 0.8–5.7 cm long; leaflets elliptic, ovate or ovate-oblong, 1.8–3.6 \times 0.6–1.4 cm, acute or subacute and mucronate at apex, obliquely obtuse at base, glabrous or lower surfaces sparsely hairy; lateral nerves oblique, conspicuously reticulate veined especially on lower surfaces; margins densely ciliate; lower surfaces usually shiny and with few pellucid dots; petiolules 0.5–1 mm long, hairy. Stipules narrowly elliptic, 10–18 \times 1.5–3 mm, acuminate at both ends, 7-nerved, glabrous, sparsely pellucid-dotted, ciliate; spur 3–6.5 mm long. Inflorescences 9.5–17.5 cm long, 5–17-flowered, usually with large, \pm distichous, overlapping bracts towards apex, separated towards base (internodes 1.5–3 times as long as bracts); peduncles 2.7–8 cm long; bracts ovate, (8–)11–13.5 \times 3–6 mm, acute at apex, usually with prominent truncate, bilobed or obtuse spur at base, 5-nerved with prominent nerves and reticulate venation, ciliate, obscurely pellucid-dotted; spur 1.5–3.5 mm long. Calyx 3–4 mm long; petals orange-yellow; standard 7–12 mm long. Fruits (2–)4–6-articulate; articles 2.5–3.5 \times 2–2.5 mm, hairy, pale with pale reticulate venation, covered with bristles; bristles about 1 mm long, retrorse hairy.

Selected specimens: Queensland. COOK DISTRICT: Weipa, track between Pappan Ck and Isenbert's landing, Mar 1986, *Foster* 2001 (BRI); Lizard Island, Jun 1973, *Fosberg* 54927 (BRI); ditto, May 1975, *Byrnes* 3192 (BRI); ditto, Sep 1988, *Batianoff* 10143 (BRI); Cape Flattery, 53 km NNE of Cooktown, Apr 1975, *McDonald & Batianoff* 1581 (BRI); Cape Bedford, Jun 1968, *Pedley* 2614 (BRI); Cooktown, Mar 1977, *Scarth-Johnson* 386A (BRI); Mt Saunders, May 1964, *Scarth-Johnson* 1443A (BRI); Endeavour River, in 1882, *Persieh* 354 (MEL); Bloomfield Beach, ca 1.6 km N of Bloomfield River mouth, Sep 1960, *Smith* 1020 (BRI).

Distribution and habitat: Known only from Queensland, from Cape York Peninsula south to the Daintree River (**Map 10**); chiefly coastal, on sand dunes and headland ridges.

Z. maritima is characterised by the usually shiny finely pellucid-dotted lower surface of leaflets which are also usually conspicuously reticulate veined. Although the leaflets are usually narrowly ovate-oblong, some plants with broader leaflets are difficult to separate from the very variable *Z. prostrata*, but in the latter species the leaflets are neither shiny nor dotted and not prominently reticulate on lower surfaces and the bracts are also smaller. Further collections of *Z. maritima* may possibly show the two species to be conspecific. Plants with conspicuous pellucid dots on leaflets also approach some forms under *Z. muelleriana* Mohl. but the dots are too infrequent to allow inclusion under the latter species.

Etymology: The specific epithet refers to the habitat in which this species is usually found.

9. *Zornia muriculata* Mohl., *Webbia* 16: 75, f. 36 & f. 55 (1961). **Type:** Northern Territory. Morgan's Island, Blue Mud Bay, Gulf of Carpentaria, 20 January 1803, *R. Brown* s.n. (holo: BRI; iso: K, MEL, NSW)

Z. diphylla var. *hirsuta* Domin, *Biblioth. Bot.* 89: 209 (1926). **Type:** Queensland. Mareeba, February 1910, *K. Domin* (syn: PR); Chillagoe, February 1910, *K. Domin* (syn: PR); Castle Hill, Townsville, February 1910, *K. Domin* (syn: PR), South Percy Island, 5 March 1906, *H. Tryon* (syn: PR; isosyn: BRI).

Z. diphylla var. *xerophila* Domin, l.c. **Type:** Queensland. COOK DISTRICT: Walsh River, north of Chillagoe, February 1910, *K. Domin* (syn: PR); near Lappa Junction, February 1910, *K. Domin* (syn: PR).

Herbs to 35 cm high with usually erect, tufted, hairy epunctate stems, rarely plants semiprostrate or glabrous. Petioles 0.5–2.5 cm long; leaflets very variable, obovate, elliptic, oblong, obovate or linear, (0.5–)0.7–3.2 cm long, 0.5–9 mm wide, lower ones smaller and broader than upper ones, obtuse or acute and mucronate at apex, base obtuse or subacute, glabrous or subglabrous above, sparsely hairy below, epunctate or rarely with few obscure pellucid dots; lateral nerves 1–3 pairs, basal pair erect ascending

along margin, conspicuous or obscure, usually darkish coloured; petiolules 0.5–1 mm long. Stipules usually conspicuous, elongate, narrowly elliptic, ovate, \pm falcate, 5–14 \times 1–2.5 mm, acuminate at apex, spurred at base, 3–5-nerved; reticulate venation obscure; spur 0.5–4 mm long, acute, acuminate or truncate. Inflorescences 2.5–9.5(–15) cm long, 3–15(very rarely 20–23)-flowered, with overlapping to separated bracts; peduncles 0.3–1.5(–2.8) cm long; bracts narrowly ovate or \pm falcate, 5.5–15 \times 1–5 mm, acuminate at apex, usually narrowly spurred at base, ciliate, epunctate or rarely with few pellucid dots, 3–5-nerved; spur 0.5–5.5 mm long, acute or acuminate. Calyx 2–3 mm long; petals yellow with red markings; standard 5–9 mm long. Fruits 1–4(–6)-articulate, exerted or included; articles 2–3 \times 1.5–2.5 mm, usually whitish with reddish reticulate venation, epunctate or with a few glands, glabrous (sometimes finely hairy), with small, blunt or acute, or well developed bristles; bristles mostly at periphery, to 1 mm long.

Z. muriculata is characterised by the usually erect, hairy (or rarely glabrous) stems, congested bracts, usually glabrous fruits with long or small short bristles and usually elongate conspicuous stipules. The majority of plants have prominently nerved and reticulate veined leaflets and bracts.

Leaflets, bracts, stipules, fruits and hairiness are all very variable, sometimes even in one individual plant but the species nevertheless remains distinctive. Usually plants are erect but sometimes those near coastal areas are semiprostrate, and have laxly branched, elongate, glabrous or sparsely hairy stems, conspicuous long stipules, and 1–3-articulate fruits which are muriculate or with few long weak bristles. Plants from further inland are usually densely hairy with much-branched, tufted, erect stems, small stipules and 2–4-articulate fruits with prominent muriculations or with \pm rigid, long bristles. This is the common form in the Northern Territory. Some plants from coastal areas with long, \pm semiprostrate stems resemble some of those under *Z. dyctiocarpa* var. *filifolia* but that taxon has very interrupted few-flowered inflorescences and hairy fruits.

Two subspecies are recognised, although they are very variable and merge into each other.

Leaflets (3–)4–9 mm wide, 2–6(–7) times as long as wide, sometimes pellucid-dotted; nerves usually prominent. Stems erect (rarely semiprostrate), laxly branched, glabrous or hairy. Stipules conspicuous, (7–)10–14 mm long. Articles 1–4, with few short or long weak bristles subsp. **muriculata**

Leaflets 0.5–3.5 mm wide, (5–)7–10 times as long as wide, usually not pellucid-dotted; nerves obscure or absent. Stems erect, tufted, usually hairy. Stipules 5–7 mm long. Articles (1–)2–5, covered with conspicuous, \pm rigid, long bristles, or bristles few, small, acute or blunt subsp. **angustata**

Zornia muriculata subsp. **muriculata**

Z. diphylla var. *hirsuta* Domin, l.c.

Distinguishing characters are as set out in the key above.

Plants usually with prominently nerved leaflets, stipules and bracts. Leaflets 1.8–3.2 cm long, (3–)4–9 mm wide, rarely less, nerves mostly dark and ascending. Stipules (7–)10–14 mm long, sometimes longer than petiole, often \pm falcate. Inflorescences 3–10(–13)-flowered; bracts (8–)10–15 mm long, overlapping towards apex, interrupted below; peduncles 0.7–2.5 cm long. Articles 1–4, mostly pale or glaucous with reddish reticulation, muriculate or with few weak fine bristles at periphery.

Selected specimens: Northern Territory. Morgan's Island, Blue Mud Bay, Jan 1803, *Brown* (BRI,CANB,K,NSW). Queensland. COOK DISTRICT: Goode Island, in 1881, *Powell* (MEL); Mabiug Island, May 1911, *Bick* 64A (BRI); Andoom, Arunta, 13 km N of Lorim Point, Weipa, Apr 1982, *Morton* 1681 (BRI); Near Atherton, Jan 1966, *Hyland* 3880 (BRI). NORTH KENNEDY DISTRICT: Rockingham Bay, *Dallachy* (BRI,MEL). PORT CURTIS DISTRICT: S Percy Island, Mar 1906, *Tryon* (BRI).

Distribution and habitat: Chiefly coastal Northern Territory and Queensland, from Gulf of Carpentaria and Cape York Peninsula to Central Queensland, also on offshore islands

(Map 5); occurs usually in sandy soil in open woodlands or grasslands, or in cleared areas.

Subspecies *muriculata* is very variable with at least two taxa recognisable within this subspecies but because of the presence of intermediate forms they are not formally segregated here. The typical form has elongate, ascending (or semiprostrate), glabrous or sparsely hairy stems and narrow leaflets and occurs along the coast of northern Queensland to as far south as Shoalwater Bay, including islands of the Gulf of Carpentaria and Torres Strait. Leaflets of these plants are elliptic-oblong or \pm falcate and 4–6 times as long as wide. Their stipules are conspicuous, \pm falcate and sometimes longer than the petioles, and their bracts usually have a narrow falcate spur. Fruits 1–4-articulate; articles have short, sharp or blunt bristles, or weak, slightly longer fine bristles.

The broad leaved hirsute form occurs on the Atherton Tableland and extends to Percy Island. Plants are hairy with usually short tufted stems and broad leaflets. Their leaflets are elliptic, oblong or obovate, and 2–4 times as long as wide. Stipules and bracts are smaller than in the typical form and the bracts mostly have a short spur. Fruits are 2–4-articulate; articles usually have short blunt bristles or with weak acute longer bristles. Some of these plants were described as *Z. diphylla* var. *hirsuta* by Domin.

Collections from the Percy Islands are intermediate between these two forms and also subsp. *angustata*. Future collections may show them to represent a distinct variety or subspecies.

***Zornia muriculata* subsp. *angustata* S. Reyn. & Holland subsp. nov.** a subsp. *muriculatae* Mohl. foliolis angustatis minoribus, stipulis bracteisque minoribus, caulibus ramossissimis caespitosis plerumque villosis, et leguminibus setosis muriculatisve differt.
Typus: Northern Territory. Near Balbirini Creek (16°35'S, 135°20'E), alt. 189–192 m, May 1947, S.T. Blake 17742 (holo: BRI; iso: CANB,NT).

Z. diphylla var. *xerophila* Domin, l.c.

Distinguishing characters are as set out in the key above.

Plants usually densely villous, with tufted much-branched, erect stems and very narrow and usually small leaflets, small stipules and bracts. Leaflets narrowly elliptic or linear, 0.5–2.1(–2.5) cm long, 0.5–2(–3.5) mm wide, (5–)7–10 times as long as wide. Stipules 5–7 mm long. Inflorescences (4–)9–15(rarely 20–23)-flowered; bracts 5.5–9.5 mm long, overlapping to separated; peduncles 0.3–1.5(–2.8) cm long. Articles 1–5, covered with prominent, \pm rigid bristles (mostly Northern Territory plants) or with few, small, blunt or acute ones (chiefly Queensland plants).

Selected specimens: Western Australia. Packsaddle Ck, northern Carr Boyd Ranges, Mar 1978, Hartley 14397 (CANB); Mt Bell, Jun 1978, George 15148(PERTH). Northern Territory. Near Batten Ck, about 10 km along Ryan Bend waterhole Rd, Feb 1976, Craven 3854 (CANB); 94 miles [162 km] E of Daly Waters, Mar 1972, Byrnes 2509 (CANB,DNA,NT); Tanumbirini Station, Mar 1979, Henshall 2543 (NT); Balbirini Ck, May 1947, Blake 17742 (BRI,CANB,NT). Queensland. COOK DISTRICT: Walsh, in 1891, Barclay Miller (BRI). BURKE DISTRICT: 7 km W of Kajabbi, on Mt Cuthbert Rd, Feb 1978, Schmid 420 (BRI). NORTH KENNEDY DISTRICT: Ravenswood, Mar 1943, Blake 14862 (BRI). MITCHELL DISTRICT: about 15 miles [24 km] S of Muttaborra, Jun 1949, Everist 3889 (BRI). DARLING DOWNS DISTRICT: Brookvale Park area, 12 km W of Oakey, Apr 1980, Ballingall 2139 (BRI). New South Wales. 7 miles [11.5 km] NW of South Grafton, Gwydir Highway, Feb 1973, Tindale 2047 & Wilson (NSW); Oxley's Station, Mar 1843, Leichhardt [NSW 183612] (NSW).

Distribution and habitat: Widespread in northern Australia, from the Kimberleys, Western Australia, to Darwin and Gulf District, Northern Territory and in north west and eastern Queensland to as far south as Grafton in New South Wales (Map 6); occurs usually in sandy rocky soil, on stony ridges, slopes, rocky outcrops and sandstone hills, in open woodlands.

Subspecies *angustata* is very variable; several forms are included but because they intergrade into each other throughout their range, they are not formally segregated here. Plants from northwestern Queensland and Northern Territory have small narrow leaflets and 2–4-articulate fruits covered with \pm rigid fairly long bristles, and inflorescences with congested overlapping small bracts and short peduncles. Most of these are densely hairy (except a collection from near Katherine which is glabrous). The majority of plants from Queensland and from New South Wales have longer, narrow leaflets, interrupted inflorescences and 2–4(–5)-articulate fruits, articles are with few small blunt or acute bristles.

A group of plants from around the Palmer and Walsh Rivers, and from Ravenswood and Townsville in Queensland, have linear, \pm concave, small leaflets, very interrupted inflorescences with usually small bracts and few flowers, and 1–3(–4)-articulate mostly included fruits; articles have a few weak bristles only at margins. These plants were described as *Z. diphylla* var. *xerophila* by Domin. Determining whether they are distinct from other forms of subsp. *angustata* or not must await study of further material.

Etymology: the subspecific epithet refers to the narrow leaflets of the subspecies.

10. *Zornia floribunda* S. Reyn. & Holland **species nova**; planta inter *Z. muriculatae* Mohl. et *Z. dyctiocarpae* DC. quasi intermedia, quoad formam foliorum et leguminum cum *Z. dyctiocarpae* sat congruens sed foliolis longioribus, bracteis congestibus et caulibus erectis differt; a *Z. muriculatae* haud aegre foliolis inflorescentis et pedunculis longioribus et leguminibus (1–)3–6-articulatis puberulis setulosis distinguitur. **Typus:** Queensland. PORT CURTIS DISTRICT: Gladstone, 10 March 1937, *S.T. Blake* 12814 (holo: BRI).

Herbs to 50 cm high, with erect, sparsely branched, glabrous or sparsely antrorse hairy, epunctate stems. Petioles 12–25 mm long; leaflets narrowly ovate-oblong, elliptic, or \pm linear, 2.6–4 cm long, 1–2.5 mm wide, acute at apex, glabrous, rarely with few obscure marginal pellucid dots on lower surfaces; petiolules to 1 mm long, pilose. Stipules narrowly elliptic or \pm triangular, 11–15 \times 1.5–2 mm, with prominent basal spur and acuminate at both ends or truncate at base, 5-nerved; spur 2–3.5 mm long. Inflorescences 14–22 cm long, (4–)13–20-flowered with bracts barely touching to overlapping about half their length towards apex or separated, especially towards base (internodes to 3 times as long as bracts); peduncles 2.7–8 cm long; bracts narrowly ovate-elliptic (7–)11–12 \times 3–5 mm, with a small basal spur, 5-nerved, with few obscure dots, ciliate; spur 1–2.5 mm long, acute. Calyx 3–4 mm long; petals yellow, streaked red; standard 7–9 mm long. Fruits (1–)3–6-articulate; articles 2 \times 2.5 mm, finely hairy, with a few peripheral bristles or with small bristles scattered over the article, prominently reticulate veined and with small and obscure glands, rarely glabrous and long bristly.

Selected specimens: Queensland. NORTH KENNEDY DISTRICT: Approx. 40 miles [64 km] SE of Mt Garnett, Nov 1967, *Morain* 231 (BRI). SOUTH KENNEDY DISTRICT: 8 km SE of Eungella Dam, Apr 1978, *Byrnes* 3627 & *Clarkson* (BRI). PORT CURTIS DISTRICT: Gladstone, Mar 1937, *Blake* 12814 (BRI); 52 miles [83.2 km] from Gladstone on Biloela Rd, Apr 1962, *Johnson* 2268 (BRI). LEICHHARDT DISTRICT: 4 miles [6.4 km] NE of New Twin Hills H.S., Aug 1964, *Pedley* 1736 (BRI). BURNETT DISTRICT: 30 km NNE of Gayndah, Dec 1972, *Pedley* 4010 (BRI). WIDE BAY DISTRICT: Elliott Railway Bridge near Bundaberg, Dec 1938, *Goy & Smith* 585 (BRI); Toolara S.F. Cpt 102, South Dempster, Feb 1983, *Podberscek* 2 (BRI).

Distribution and habitat: From near Mt Garnett in northern Queensland to northern New South Wales (**Map 2**); occurs usually in sandy soil, on sandy ridges and hillsides in eucalypt forests.

Z. floribunda is distinguished by the usually densely flowered long inflorescences with \pm congested bracts and long peduncles, exserted, hairy or glabrous, moderately or sparsely bristly fruits and also by the long narrow leaflets and erect stems. It is closely related to *Z. muriculata* Mohl. and *Z. dyctiocarpa* DC. and is almost intermediate between these species and has been confused with both in the past. It agrees with *Z. dyctiocarpa* in the nature of the leaves and to a certain extent the fruits but differs in habit, in longer leaflets, congested bracts, bristly, hairy or glabrous fruits. From *Z. muriculata* it can be distinguished by the long narrow leaflets, long inflorescences and peduncles, and usually hairy, (1–)3–6-articulate fruits.

Note: Leaflets and bracts are very variable. Plants from around Gladstone and Rockhampton are typical of the species having elongate narrow leaflets and long many-flowered inflorescences with \pm congested bracts. Plants from southern Queensland and northern New South Wales (e.g. Bingara Lookout, Feb 1977, *Wilson* (NSW)) are, however, atypical and approach *Z. dyctiocarpa* DC. in leaves and bracts (but in the latter species the bracts are separated and the stems are prostrate). More collections are needed (especially from the latter localities i.e. southern Queensland and New South Wales) to determine whether the stems are always erect and the bracts always \pm overlapping.

11. *Zornia ramosa* S. Reyn. & Holland *species nova*, *Z. dyctiocarpae* var. *filifoliae* (Domin) S. Reyn. & Holland primo aspectu maxime similis sed floribus solitariis et caule plerumque erecto ramosissimo differt. **Typus:** Queensland. COOK DISTRICT: Thursday Island, 14 May 1901, *Jaheri* s.n. (holo: BRI; iso: K).

[*Z. filifolia* auct. non Domin: Mohlenbrock, *Webbia* 16: 52, f. 32, 34 (1961).]

Herbs 20–60 cm high, with ± erect or ascending, slender, usually much-branched, glabrous, epunctate stems. Petioles filiform, 5–16 mm long, glabrous; leaflets narrowly ovate to linear, 1–3 cm long, 0.5–1 mm wide, acuminate at apex, obtuse at base, glabrous, epunctate, rarely with few small dots on lower surfaces; midrib prominent; petiolules to 1 mm long. Stipules narrowly rhombic, 2–6 × 0.5 mm, with narrow basal spur, acuminate both ends, glabrous, rarely with few pellucid dots, 3–5-nerved; nerves inconspicuous; margins pale; spur 0.5–1.5 mm long. Inflorescences of solitary flowers usually on long, filiform, glabrous peduncles, 1.2–2.5 cm long; bracts narrowly ovate or falcate, 5–7 × 1–2 mm, acute or acuminate at both ends, with slender spur at base, 3-nerved, epunctate or with few pellucid dots; spur 1–2 mm long. Calyx 2–3 mm long; petals yellow or purplish; standard 5–7 mm long. Fruits (1–)2–4-articulate, crenate on lower margins, exerted; articles 2–2.5 × 1.5–2 mm, puberulent, prominently reticulate veined, bristly; bristles to 0.5 mm long, hairy.

Selected specimens: Queensland. COOK DISTRICT: Thursday Island, May 1901, *Jaheri* s.n. (BRI,K); ditto, without date, *Cowley* 14 (BRI); Lockerbie, 10 miles [16 km] WSW of Somerset, Apr 1948, *Brass* 18441 (BRI,CANB); ditto, May 1948, *Brass* 18584 (BRI,CANB); 45 km N of Coen (13°36'S, 143°02'E), Jun 1981, *Macconochie* 2708 (BRI); Hann River Crossing, Lakefield National Park (15°1'-S, 143°-E), Jul 1983, *Hacker* 420 (BRI).

Distribution and habitat: So far known only from Cape York Peninsula, Queensland (**Map 13**); occurs in sandy soil on lateritic ridges, riverbanks and in disturbed areas, among grasses.

Z. ramosa is distinguished from other Australian species (except *Z. pedunculata* S. Reyn. & Holland) by its solitary flowers. (It is distinguished from *Z. pedunculata* by the narrow leaflets and hairy bristly fruits). It resembles *Z. dyctiocarpa* var. *filifolia* S. Reyn. & Holland, in leaflets, stipules, bracts and fruits but the flowers are not solitary, and the stems are prostrate in the latter species.

Note: *Z. ramosa* is a name provided for plants previously called *Z. filifolia* by Mohlenbrock (1961) and plants identified as such using his monograph.

Mohlenbrock's treatment of *Z. filifolia* Domin and *Z. adenophora* (Domin) Mohl. has created much confusion with regards to the identity of the species concerned. When he described *Z. filifolia*, he cited a single specimen, namely *Cowley* 14 from Thursday Island, without date, (BRI), and his description and illustration matched this specimen. It is not, however, conspecific with the type of *Z. filifolia* Domin, viz Domin's collections from Rocky Island, Yarrabah (PR). It differs chiefly in the type of inflorescence, indicating two distinct species are involved. In addition to this, when Mohlenbrock raised *Z. filifolia* var. *adenophora* Domin to species rank as *Z. adenophora*, he included *Z. filifolia* var. *subeglandulosa* Domin in synonymy. That name was not validly published as the taxon it referred to included the type of *Z. filifolia* and hence should have been published as *Z. filifolia* var. *filifolia*. Mohlenbrock's concept of *Z. adenophora* thus includes the type of *Z. filifolia* so the name he used for that species should have been *Z. filifolia* Domin. The plants Mohlenbrock identified as *Z. filifolia* thus require a different name, and since no other names appear applicable, the name *Z. ramosa* has been provided for the species concerned. Since the type of *Z. filifolia* var. *filifolia* and of *Z. filifolia* var. *adenophora* are not conspecific, two other taxa are involved. They are treated here as *Z. dyctiocarpa* var. *filifolia* and *Z. adenophora* respectively. Mohlenbrock's confusion with these plants is highlighted by his determination of the BRI sheet of *Cowley* 14 as *Z. ramosissima*, a name that was not subsequently published, and of the BRI sheet of *Jaheri* s.n. (type of *Z. ramosa*) as *Z. cantonensis* Mohl., both belonging to the one taxon. The latter specimen was not cited in his account and did not match collections of *Z. cantonensis* he did cite.

The three taxa that have been confused, namely *Z. filifolia* Domin (now *Z. dyctiocarpa* var. *filifolia*), *Z. adenophora* and *Z. ramosa* can be distinguished as follows:

1. Leaflets linear, conspicuously densely pellucid-dotted. Fruits covered with large glands; bristles absent **Z. adenophora**
 Leaflets linear or narrowly ovate, not pellucid-dotted or rarely with few obscure pellucid dots. Fruits eglandular, bristly or non bristly 2
2. Inflorescences few-flowered with very separated bracts, rarely flowers solitary (then in combination with spikes on same plant). Stems prostrate, usually laxly branched. Fruits usually scarcely bristled **Z. dyctiocarpa** var. **filifolia**
 Flowers solitary throughout. Stems ± erect or ascending, usually much-branched. Fruits bristly **Z. ramosa**

12. *Zornia pedunculata* S. Reyn. & Holland **species nova** quoad flores solitarios cum *Z. ramosa* S. Reyn. & Holland congruens sed caulibus ± prostratis, foliis ovatis et leguminibus glabris differt. **Typus:** Queensland. PORT CURTIS DISTRICT: 60 km SW of Gladstone, Kroombit Tableland, tributary of Kroombit Creek, 3.2 km SSW of Amy's Peak (24°22'S, 150°59'E), alt 800 m, 4 June 1977, *M.D. Crisp* 2766 (holo: BRI).

Herbs with slender, few-branched, glabrous, obscurely pellucid-dotted stems. Petioles 0.9–1.6 cm long; leaflets ovate, 0.9–1.9 cm long, 3–5 mm wide, acute and mucronate at apex, obtuse at base, slightly oblique, glabrous, epunctate, lateral nerves obscure; petiolules *ca* 1 mm long, subglabrous. Stipules narrowly elliptic or rhombic, 7–9.5 × 1.5 mm, acuminate at apex, acute and prominently spurred at base, 5–7-nerved, sparsely punctate; spur *ca* 2.5 mm long. Inflorescence of solitary flowers; peduncles 3–4 cm long, filiform; bracts ovate, 10 × 2.5 mm, acuminate at apex, with prominent basal spur, 5-nerved, glabrous, obscurely yellow pellucid-dotted; spur *ca* 2.5 mm long. Flowers not seen. Fruits 3- or 4-articulate; articles glabrous, prominently reticulate veined with red venation; with short bristles or bristles absent, sparsely gland-dotted.

Distribution and habitat: Known only from type from central Queensland (**Map 13**); rare on sandy clay loam on creek flats in open forests.

Z. pedunculata is easily recognisable by its solitary flowers, long peduncles, ovate leaflets, and glabrous fruits with short bristles or lacking bristles. Further collections are needed to determine whether the flowers are always solitary as in *Z. ramosa* which has narrowly ovate to linear leaflets and hairy bristly fruits. Nevertheless the plants are sufficiently distinct to be described as belonging to a new species. A number of new species in other families have been found on Kroombit Tableland in recent years.

Etymology: The specific epithet refers to the long peduncles.

13. *Zornia pallida* Muhl., *Webbia* 16: 130, f. 36 & 87 (1961). **Type:** Queensland. MARANO DISTRICT: Bungeworgorai, May 1913, *J. Soutter* s.n. (holo: BRI(AQ022931)).

Prostrate herbs with glabrous epunctate stems. Petioles 15–20 mm long; leaflets narrowly ovate-oblong, 1.1–3.2 cm long, 4.5–6 mm wide, acute at apex, obtuse at base, (lower ones usually smaller and broader than upper ones), glabrous, sparsely pellucid-dotted below; lateral nerves obscure; petiolules *ca* 1 mm long. Stipules narrowly elliptic, 8.5–10 × 1.5–2 mm, acute or acuminate at apex, prominently spurred at base, 5-nerved, epunctate; spur *ca* 2.5 mm long, acuminate or truncate. Inflorescences 12–16 cm long, 9–13-flowered with bracts overlapping about 1/4 their length or barely touching each other, usually separated towards base; peduncles 4–4.5 cm long; bracts elliptic-ovate, 10–12 × 5–6 mm, acute at apex, prominently spurred at base, 5–7-nerved, obscurely reticulate veined, epunctate or rarely with few pellucid dots; spur 1–2 mm long, acute or sometimes truncate. Calyx 3.5–5 mm long; standard to 12 mm long. Fruits 3–5-articulate; articles 2–3 × 3–3.5 mm, hairy or glabrous with hairy or glabrous prominent bristles; bristles 1–5 mm long.

Selected specimens: Queensland. PORT CURTIS DISTRICT: Broadsound, collector unknown [MEL 1551174] (MEL); Stanage Point, about 100 miles [160 km] N of Rockhampton, Aug 1964, *Gittins* [NSW 14261] (BRI,NSW). LEICHHARDT DISTRICT: Nebo Creek, *Bowman* [MEL 1554084] (MEL). MARANO DISTRICT: Bungeworgorai, May 1913, *Soutter* (BRI). BURNETT DISTRICT: Gayndah, Aug 1959, *Schoneveld* 134 (BRI).

Distribution and habitat: Known only from Queensland (from near Rockhampton to Gayndah) (Map 9); occurs usually in eucalypt woodlands or disturbed areas.

Z. pallida is characterised by the narrowly ovate-oblong leaflets with sparsely pellucid-dotted lower surfaces and overlapping, comparatively large bracts with a prominent basal spur, and 3–5-articulate fruits with large, usually hairy, bristly articles.

It is closely related to *Z. dyctiocarpa* DC. having similar leaflets and bracts but differs in the overlapping bracts, the large hairy articles and prominent hairy bristles. The fruits and flowers especially those in collections from Broadsound and Stanage Point, are not unlike those of *Z. prostrata*, but in that species the leaflets are usually wide and bracts separated.

Note: This species is known from only a few, mostly inadequate collections. It is almost impossible to separate sterile specimens of it from the variable *Z. dyctiocarpa*. More collections are needed to determine its full variability and ascertain its relationship with the latter species.

14. *Zornia dyctiocarpa* DC., Prod. 2: 317 (1825). **Type:** Novae Hollandiae, Sieber 610 (Microfiche BRI).

Z. filifolia Domin, Biblioth. Bot. 89: 210 (1926). **Type:** Queensland. COOK DISTRICT: Rocky Island, Yarrabah, January 1910, K. Domin (PR(PR 527341–42)).

Z. filifolia var. *subglandulosa* Domin. l.c., nom. inval.

[*Z. diphylla* auct. non (L.) Pers.: Benth., Fl. austral. 2: 228 (1884); Bailey, Qd Fl. 2: 409 (1900); Domin, Biblioth. Bot. 89: 208–209 (1926).]

Herbs with prostrate or semiprostrate, usually dichotomously branched stems 9–52 cm long. Stems, petioles, leaflets, stipules and bracts glabrous or with few appressed hairs, epunctate, rarely with few minute glands. Petioles 1.5–3 cm long; leaflets variable on one plant, ovate, narrowly ovate-oblong or elliptic to linear, 1–3 cm long, 1–8 mm wide (lower ones smaller and broader than upper ones), apex acute or acuminate and mucronate, base obtuse or acute, midrib usually sunken above; lower surfaces sometimes with few minute marginal dots; petiolules to 1 mm long. Stipules narrowly ovate or subrhombic, 5–13 × 0.5–2 mm, acute or acuminate at apex with a narrow spur at base, glabrous, rarely ciliate, 3–5-nerved, reticulate venation obscure; spur 1–5 mm long, acute or acuminate. Inflorescences 4–28 cm long, (1–)2–12-flowered, with widely separated bracts (internodes 2–5 times as long as bracts); peduncles 3–13 cm long; bracts ovate or elliptic, sometimes narrow, oblique or falcate, 5–15 × 1–5 mm, acute or acuminate at apex, usually with a conspicuous long and narrow spur at base, glabrous, ciliate, 5-nerved, reticulate venation obscure, rarely with few pellucid dots; spur 1–3 mm long, acute or toothed. Calyx 2–4 mm long; petals yellow or orange, with red flecks; standard 5–9 mm long. Fruits (2–)4–9-articulate, rarely less; articles 1.5–3 × 1.7–3 mm, thickly margined, glabrous or rarely puberulent, conspicuously reticulate veined with reddish brown venation, eglandular or rarely with few glands; bristles absent or if present to 0.5 mm long, retrorse hairy, usually at periphery of article.

Z. dyctiocarpa is characterised by the long inflorescences with very interrupted bracts, and long, exserted, 4–9-articulate fruits with prominent ± dark, reddish brown reticulate venation, by the prominent long spur at the base of bracts and by the narrowly ovate-oblong, elliptic or linear leaflets, with smaller broader ones at base.

Note: Leaflets, bracts, stipules, number of flowers and articles vary considerably in the same population as does the presence or absence of bristles on the articles. The majority of plants from New South Wales have ovate, elliptic or narrowly ovate-oblong leaflets and prominently spurred bracts, while most of the plants from Queensland have narrower leaflets and smaller bracts with a small spur. The inflorescences of some of these latter plants are few-flowered and the bracts narrower than is usual in the species, and the fruits are 2–4-articulate and hairy. *Z. filifolia* Domin is based on some of these north Queensland plants which we consider varietally distinct but the extreme forms of each group merge into each other. The two varieties may be distinguished as follows:

- Leaflets (2.5-)3-7.5 mm wide, less than 10 times as long as wide. Bracts 2.5-5 mm wide, spur 1.5-4 mm long. Fruits (4-)6-9-articulate. Inflorescences (2-)6-13-flowered var. **dyctiocarpa**
- Leaflets 1-2.5 mm wide, 10-22 times as long as wide. Bracts 1-2 mm wide; spur 0.5-1.5 mm long. Fruits(1-)2-4(-5)-articulate. Inflorescences (1-)2-5(very rarely-7)-flowered var. **filifolia**

Zornia dyctiocarpa var. **dyctiocarpa**

Distinguishing characters are as set out in the key above.

Stems prostrate; leaflets ovate, elliptic, ovate-oblong or narrowly ovate, 1-3.5 cm long, 3-7.5 mm wide, (2-10 times as long as wide), lower ones usually smaller and broader than upper ones. Inflorescences with widely separated bracts. Bracts ovate or elliptic, (8-)10-13 × 2.5-5 mm, with prominent spur at base; spur narrow and ± falcate. Peduncles (4-)8-13 cm long. Articles 1.5-3 × 2-3 mm, with prominent reddish brown reticulate venation, glabrous or rarely finely hairy, bristle-free or sometimes bristly (mostly towards margins); bristles usually small and weak.

Selected specimens: Queensland. NORTH KENNEDY DISTRICT: Rockingham Bay, *Dallachy* (MEL). SOUTH KENNEDY DISTRICT: 8 km SE of Eungella Dam, Apr 1978, *Byrnes* 3627 & *Clarkson* (BRI). LEICHHARDT DISTRICT: Great Dividing Range near Rolleston, Jun 1977, *Crisp* 3041 (MEL). WIDE BAY DISTRICT: Fraser Island, Oct 1930, *Hubbard* 4491 (BRI). BURNETT DISTRICT: Nanango, Dec 1930, *Watson* (BRI). MORETON DISTRICT: Peregrin Beach, Feb 1979, *Batianoff* 1340 & *Elsol* (BRI). New South Wales: Pimlico near Ballina, Mar 1894, *Bauerlen* [NSW 183394] (NSW); Armidale, in 1871, *Perrott* (MEL); Barrangan beyond Mudgee, collector unknown (MEL); Tenterfield, Jan 1871, *Sturt* (MEL); Tabulan, Nov 1904, *Boorman* [NSW 46741] (NSW); Little River, 12.5 km ENE of Jenolan Caves, Jun 1971, *Rodd* 1614 (NSW); Black Mt, Canberra, Nov 1949, *Gaub* (AD,MEL); Bega, Dec 1920, *Rodway* [NSW 46769] (NSW).

Distribution and habitat: From Rockingham Bay, Queensland, to Bega River, New South Wales (**Map 3**); occurs usually in sandy soil in open forest and grasslands, on sand dunes, low hills and ridges and in disturbed areas.

Zornia dyctiocarpa var. **filifolia** (Domin) S. Reyn. & Holland **comb. nov.**

Z. filifolia Domin, *Biblioth. Bot.* 89: 210 (1926). **Type:** Rocky Island, Yarrabah, January 1910, *K. Domin* (syn: PR(PR 527341-42))

Z. filifolia var. *subglandulosa* Domin, l.c., nom inval.

Distinguishing characters are as set out in the key above.

Stems very slender, few-branched, prostrate or ± prostrate. Leaflets usually linear, ± concave, 1.2-2.7 cm long, 1-2(-2.5) mm wide. Inflorescences with few (1-5 rarely -7), widely spaced, small, narrow bracts. Bracts narrowly elliptic, 5-7 × 1-2 mm; spur narrow and ± falcate. Peduncles 3.5-6 cm long. Articles 1.7-2 × 1.7-2 mm, usually finely hairy, bristles few, usually small and weak or absent.

Selected specimens: Queensland. COOK DISTRICT: Yorkey's Knob near Cairns, Apr 1962, *McKee* 9037 (BRI,CANB); Rocky Island, Yarrabah, Jan 1910, *Domin* (PR). NORTH KENNEDY DISTRICT: Palm Island, *Bancroft* [AQ 239394] (BRI). SOUTH KENNEDY DISTRICT: Pindi Pindi, Feb 1959, *Mathews* 24 (BRI).

Distribution and habitat: Chiefly coastal Queensland, from near Mossman River to Pindi Pindi (**Map 4**); occurs usually in sandy rocky soil in disturbed areas.

Note: Forms intermediate between the varieties are present around Brisbane and Coaldale, northern New South Wales.

Z. dyctiocarpa var. *filifolia* is recognisable by its very slender, few-branched stems, by the very narrow leaflets and bracts, and by inflorescences with widely spaced few flowers. The plants resemble *Z. ramosa* in general appearance but the flowers are solitary in that species. Some semi-prostrate forms of *Z. muriculata* are also difficult to distinguish from this variety, but in *Z. muriculata* the inflorescences usually have more flowers and overlapping bracts, and the fruits are usually glabrous and muriculate or with long bristles.

Typification: The type of *Z. dyctiocarpa* DC. is *Sieber* 610, from New Holland, exact locality unknown (not recorded on microfiche) and not *Sieber* 31 as cited by Mohlenbrock (1961). It is not known why he stated the latter, from Barrangan beyond Mudgee NSW

(MEL 1554072) as an isotype, as the type is clearly indicated by De Candolle as *Sieber* 610. There is also uncertainty with regards to the collector of *Sieber* 31. It is doubtful whether Sieber collected this specimen or that "No. 31" is his collecting number. The name of the collector is not given on the two slips of paper attached to the MEL sheet and the two handwritings thereon do not appear to match that of Sieber. Also, the "31 *Zornia dyctiocarpa*" written on a slip of paper seems more likely to be part of an identification list that has been cut into pieces, rather than a collector's number. The handwriting on the blue label giving the place of collection is very similar to that of Allan Cunningham who collected in that area in 1823 and who used similar blue paper to record his collecting data. It is possible that he collected this specimen numbered 31. Although we have not been able to locate the type, we are confident that Mohlenbrock's concept of the species is correct. The specimens cited, mostly annotated by him, agree with the protologue and with the microfiche (at BRI) of *Sieber* 610. Moreover Sieber collected in New South Wales where this plant is a common species and his specimen (microfiche) is a good match for plants from New South Wales.

15. *Zornia albiflora* Mohl., *Webbia* 16: 65, f. 40, 48 (1961). **Type:** Northern Territory. 1 mile [1.6 km] S of Elkedra H.S., 22 October 1956, *G. Chippendale* 3104 (holo: BRI; iso: AD,CANB,MEL).

Z. nervata Mohl., *Webbia* 16: 130 (1961). **Type:** Queensland. GREGORY NORTH DISTRICT: 50 miles [80 km] SE of Camooweal, 12 December 1947, *S.L. Everist* 3388 (holo: BRI).

Hairy herbs 13–30 cm high with much-branched, erect or spreading stems. Petioles 0.4–2.5 cm long, densely patent hairy; leaflets broadly elliptic or oblong, oblique, 0.6–2.1 × 0.4–1.3 cm, obtuse or subacute at apex, obtuse at base, sparsely hairy above, densely hairy below with appressed hairs, epunctate, rarely with few obscure pellucid dots; lateral nerves oblique, prominent; petiolules to 1 mm long. Stipules narrowly elliptic or subrhombic, 5–9 × 1.5–3 mm, acute at apex, with a long, narrow, acute spur at base, 3–5-nerved; nerves usually prominent and reddish in colour; spur 1–3.5 mm long. Inflorescences 4–7 cm long, (1–)3–10(–21)-flowered, with overlapping distichous bracts ± separated towards base (internodes 1/2–1(–2) times as long as bracts); peduncles 1.5–4 cm long; bracts broadly ovate to suborbicular, 6.5–12.5 × 4–8 mm, acute at apex, usually shortly spurred or subcordate at base, 4–7-nerved, sparsely hairy, ciliate, epunctate or rarely with a few glandular dots; nerves and reticulate venation conspicuous, reddish coloured, especially in older specimens; spur 1–3 mm long, truncate or obtuse, sometimes minute and inconspicuous or almost absent. Calyx 3–3.5 × 1.5–2.5 mm; petals white or yellow; standard 4–6 mm long. Fruit (1–)2–4(–5)-articulate; articles 2–3.5 × 2–2.5 mm, finely puberulent and with hairy bristles, finely reticulate veined usually with pale reticulation the same colour as the articles; bristles fine, 0.5–1.5 mm long, retrorse hairy.

Selected specimens: Western Australia. Just NW of Wolf Creek Crater, Apr 1979, *George* 15286 (NT,PERTH); McLarty Hills, Great Sandy Desert, Aug 1872, *George* 14646 (CANB,PERTH); Kimberley District, in 1887, *Nyulasy* [MEL 1554131] (MEL). Northern Territory. Tanumbirini Stn, May 1947, *Blake* 17620 (BRI); SE corner of entry to Lake Surprise, Lander River, Mar 1973, *Maconochie* 1669 (BRI,DNA,NT); Tanami Desert, Lake Surprise, Jun 1982, *Gibson* [NT 69629] (NT); 40 miles [64 km] N of Wauchope, Aug 1956, *Lazarides* 5845 (NT); 1 mile [1.6 km] S of Elkedra H.S., Oct 1956, *Chippendale* 3104 (AD,BRI,MEL); About 4 km N of central Mt Stuart, Jun 1972, *Maconochie* 1415 (NT); 14 miles [22.4 km] NW of Aileron, Aug 1962, *Nelson* 417 (NT). Queensland. GREGORY NORTH DISTRICT: 50 miles [80 km] SE of Camooweal, Dec 1947, *Everist* 3388 (BRI); 28 km E of Urandangie, May 1985, *Neldner* 1979 & *Stanley* (BRI); 2 km SE of Poodyea Point, Toko Ra., Sep 1977, *Purdie* 1083 (BRI).

Distribution and habitat: Common species in Central Australia, from Great Sandy Desert, Western Australia, to Toko Ranges, western Queensland (**Map 2**); occurs in sandy soil on ranges, sandy ridges, sand dune and sand plains in deserts and semi deserts.

Z. albiflora is distinguished from closely related species by its erect, densely hairy stems, broad hairy leaflets and broad congested bracts, the latter and stipules maturing with reddish coloured nerves. This species is very similar to *Z. prostrata*. At times it is difficult to differentiate between the two species because of the presence of intermediate forms. However, in *Z. prostrata* the stems are prostrate and the bracts are usually distinctly separated, smaller and with a prominent spur, and the fruits are usually much exerted, prominently reticulate veined and bristly.

Note: *Z. albiflora* Mohl. and *Z. nervata* Mohl. have been synonymised here because the types are from the same taxon. The former is accepted for the species as the type of *Z.*

nervata is not covered by Mohlenbrock's description of the species he described as *Z. nervata* and is not conspecific with the other specimens he cited for it. Most plants previously called *Z. nervata* Mohl. are therefore treated as belonging to a new species we have named *Z. prostrata*.

16. *Zornia prostrata* S. Reyn. & Holland **species nova**, *Z. albiflorae* Mohl. et *Z. muellerianae* Mohl. primo aspectu maxime similis quoad formam foliorum et bracteorum. A *Z. albiflorae* caulibus prostratis et bracteis angustioribus plerumque distinctis, differt. A *Z. muellerianae* imprimis foliis, stipulis et plerumque bracteis eglandulosis differt. **Typus:** Queensland. BURKE DISTRICT: About 40 km W of Doomadgee Aboriginal Station, Burketown to Wollgorang road, 6 May 1974, R. Pullen 9095 (holo: BRI; iso: CANB).

[*Z. nervata* auct. non Mohl.: Mohlenbrock, Webbia 16: 130–131, f. 32, 88 (1961) quoad descriptionem et distributionem.]

Herbs with prostrate, few-branched, epunctate, pubescent to glabrous stems 10–90 cm long; hairs when present usually long, reflexed and dense. Petioles 5–25 mm long; leaflets elliptic or ovate, rarely narrowly elliptic, 0.9–3 × 0.4–1.5 cm, obtuse or subacute and mucronate at apex, obtusely suboblique at base, glabrous or puberulous, eglandular or rarely sparsely pellucid-dotted on lower surfaces; lateral nerves prominent, sometimes reddish coloured when dry, reticulate venation obscure; margins ciliate (especially in young leaves); petiolules 0.5–1 mm long, hairy. Stipules narrowly elliptic or rhombic to subovate or subfalcate, 0.4–2 cm long, 1–3 mm wide, acute or acuminate at apex, spurred at base, 5–8-nerved, usually epunctate; spur 1–8 mm long. Inflorescences 5–19.5 cm long, (4–)8–21-flowered with bracts overlapping about 1/4 their length initially, later separated (internodes 1/4–3 times as long as bracts); peduncles 1.5–7.5 cm long; bracts ovate or elliptic, 0.6–1.8 cm long, 2.5–6.5 mm wide, acute at apex, with small or prominent spur at base, 4–6-nerved, reticulate veined, ciliate, epunctate or with few pellucid dots; spur 0.5–6 mm long, obtuse or acute. Calyx 3.5–5 × 1.5–2 mm; petals yellow or white, standard 3.5–15 mm long. Fruits 2–5(–6)-articulate; articles 2–3.5 × 1.5–2.5 mm, finely hairy and with hairy bristles, with prominent reticulate venation usually the same colour as the rest of the articles; bristles 0.5–1 mm long, finely hairy.

Z. prostrata is distinguished by the long prostrate stems with few branches, erect inflorescences arising from axils of erect petioles and prostrate stems, usually separated bracts, broad leaflets, hairy long bristly fruits with hairy bristles, and articles with reticulate venation the same colour as the rest of the articles. It is at first sight very similar to *Z. albiflora* Mohl. and *Z. muelleriana* Mohl. having similar leaflets and bracts, and is no doubt very closely related to both these species. It differs from the former in its prostrate habit and usually narrower separated bracts, and from the latter in the absence of dense pellucid dots on leaflets, stems, stipules and bracts, and also in the longer petioles which are usually longer than the leaflets, and in the usually broader obtuse leaflets.

Note: *Z. prostrata* includes plants previously called *Z. nervata* Mohl. See discussion under *Z. albiflora* above.

Etymology: The specific epithet refers to the prostrate stems of the species.

The species varies considerably in shape and size of leaflets and especially the bracts. Two varieties are recognisable:

Flowers 4–9.5 mm long. Bracts 6–11 mm long; spur usually short or rudimentary, 0.5–3 mm long. Inflorescences (4–)8–21-flowered. Fruits 2–6-articulate	var. prostrata
Flowers (10–)14–17 mm long. Bracts (11–)15–18 mm long; spur elongate, 5–6 mm long. Inflorescences 4–9-flowered. Fruits 2- or 3-articulate	var. macrantha

Zornia prostrata* var. *prostrata

Distinguishing characters are as set out in the key above.

Stems hairy with usually long reflexed hairs, rarely subglabrous. Leaflets usually broadly ovate or elliptic, glabrous or sparsely hairy; lateral nerves prominent, sometimes drying reddish coloured. Stipules narrowly elliptic to subovate, 4–10 × 1–3 mm; spur 1–3 mm long. Inflorescences (4–)8–21-flowered, bracts overlapping to separated (internodes 1/4–3(–4) times as long as bracts); peduncles 1.5–4 cm long. Bracts very variable, elliptic or ovate, 6–11 × 2.5–5 mm, usually with prominent reddish coloured reticulate venation when old; spur 0.5–3 mm long.

Selected specimens: Western Australia. King Edward River crossing on road to Mitchell River Stn, May 1975, *Symon* 10249 (AD); 73 km W of Wyndham about 13 km S of Paradise Pool on Ernest River, Mar 1978, *Lazarides* 8634 (CANB,NT,PERTH); Cambridge Gulf, in 1886, *Lucornus* (MEL); 8 km SE of Kununurra, Mar 1978, *Paijajmans* 2409 (CANB). Northern Territory. Boggy Plain Ck near Jabiru, Jul 1973, *Adams* 3050 (BRI,CANB,NT); Cox River Stn, Jul 1977, *Latz* 7216 (NT); Pine Creek, Mar 1961, *Chippendale* 7586 (BRI,MEL,NT); Little Lagoon, Groote Eylandt, Apr 1948, *Specht* 187 (AD,BRI,MEL); Keep River National Park, Feb 1981, *Dunlop* 5810 (CANB,DNA); Settlement Ck, Mar 1922, *Brass* 134 (BRI). Queensland. BURKE DISTRICT: Sweers Island, *Henne* [MEL 1554122] (MEL); Old Corinda Outstation about 40 km W of Doomadgee Aboriginal Station, Burketown to Wollgorang Rd, May 1974, *Pullen* 9095 (BRI,CANB); Ifley about 80 miles [128 km] SSE of Normanton, May 1954, *Everist* 5378 (BRI). MITCHELL DISTRICT: Jericho, Mar 1946, *Clemens* [AQ309878] (BRI); approx 31 km N of Shirley H.S. on Aramac-Torrens Ck Rd, Jun 1977, *McDonald* 2621 (BRI).

Distribution and habitat: Common along the coast of northern Australia, from Broome, Western Australia, to Gulf of Carpentaria and extending to central Queensland, including offshore islands (**Map 11**); occurs usually in sandy soil in undulating country, on creek levees and scree slopes, in open woodlands and grasslands.

Var. *prostrata* varies considerably throughout its range in attributes of leaflets, stipules and bracts. Usually plants from the islands have very small, separated bracts, yet some plants have wide bracts e.g. collections from Berry Springs, Northern Territory, not unlike those of *Z. albiflora*, differ from that species in their prostrate habit. An isolated group of plants from Western Australia also has pellucid dots on leaflets, stipules and bracts, but the glands are inconspicuous and few and their presence is inconsistent, varying within the same individual.

***Zornia prostrata* var. *macrantha* S. Reyn. & Holland var. nov.** a var. *prostrata* S. Reyn. & Holland bracteis et floribus magnis (fere duplo majoribus) et leguminibus plerumque biarticulatis differt. **Typus:** Northern Territory. Katherine Gorge above Edith Falls (14°11'S, 132°14'E), 25 February 1982, *S. King* 59 (holo: DNA).

Distinguishing characters are as set out in the key above.

Stems trailing, glabrous. Petioles 1.1–2.1 cm long; leaflets elliptic or ovate, 1.4–2.8 × 0.7–1 cm, obtuse at both ends, glabrous except ciliate margins, discolourous, nerves indistinct. Stipules narrow and elongate, elliptic or rhombic, (1–)1.4–2 cm long, 2–2.5 mm wide, acuminate at apex, with elongate spur at base; spur 6–8 mm long, acuminate or obtuse. Inflorescences with separated, rarely overlapping bracts (internodes 1.5–2.5(–3.5) times as long as bracts); peduncles 2.5–7.5 cm long; bracts ovate, (1.1–)1.5–1.8 cm long, (4.5–)6–6.5 mm wide, acute at apex, usually with a very prominent spur at base, 5-nerved, obscurely reticulate veined, rarely sparsely pellucid-dotted; spur 5–6 mm long, acute or obtuse. Standard 1.4–1.7 cm long.

Selected specimens: Northern Territory. Waterfall Ck, 2 miles [3.2 km] above falls, Apr 1969, *Byrnes* 1516 (CANB,NT); 23 miles [36.8 km] ESE of El Sharana Mine, Feb 1973, *Lazarides* 7837 (CANB,NT,PERTH); Katherine Gorge above Edith Falls, Feb 1982, *King* 59 (DNA).

Distribution and habitat: Known only from Northern Territory (around Waterfall Creek and Edith Falls) (**Map 12**); occurs in sandy soil on gentle slopes and tops of sandstone escarpments.

Var. *macrantha* is easily recognisable by the large, ovate, separated bracts and large flowers. The large broad bracts with prominent basal spur, present on some plants, is very distinctive and further collections may indicate this variety is worth recognising as a distinct species. Because of the presence of intermediate forms we are keeping it under the very variable *Z. prostrata* for the present.

Etymology: The varietal epithet refers to the large flowers of this variety.

17. *Zornia oligantha* S. Reyn. & Holland **species nova** prope *Z. prostratae* S. Reyn. & Holland sed inflorescentiis paucifloris (floribus 2–8 raro–12), bracteis ovatis distinctis leguminibus glabris et articulis parvulis differt. **Typus:** Northern Territory. Smith Point, Cobourg Peninsula, about 140 km NE of Darwin, (11°07'S, 132°08'E), 5 April 1977, *R. Pullen* 10617 (holo: CANB; iso: CANB,DNA).

Prostrate herbs with usually sparsely hairy, slender stems to 31 cm long. Stems, petioles and peduncles with sparse, antrorse, appressed or spreading hairs, epunctate. Petioles 1–2.3 cm long; leaflets ovate to elliptic, (1–)1.7–1.9(–3) × (0.4–)0.6–1 cm, acute at apex, obtuse and suboblique at base, glabrous or lower surfaces hairy with scattered appressed hairs, sparsely pellucid-dotted below; lateral nerves oblique, obscure; petiolules to 1 mm long, villous. Stipules narrowly elliptic or ± triangular, 9.5–15 × 1–2 mm, acuminate at both ends or spurred or truncate at base, 5-nerved, glabrous or with few hairs on margins; spur 1–5.5 mm long. Inflorescences 2.5–4.5(–12) cm long, 2–8(–12)-flowered with usually very widely separated bracts (internodes 1–2.5 times as long as bracts); peduncles 1.5–3.5 cm long; bracts broadly ovate, 6–9.5 × 3.5–4.5 mm, acute at apex, with short spur at base, 5-nerved, ciliate, glabrous or with few appressed hairs, obscurely reticulate veined, epunctate or with fine pellucid dots; spur 0.5–2.5 mm long, acute, rounded or truncate. Calyx 3.5 mm long; petals yellow; standard to 9 mm long. Fruits (3 or) 5–7-articulate, exserted; articles 1.5–2 × 1.5–1.8 mm, finely hairy (when young) to glabrous, obscurely reticulate veined and sparsely covered with small yellow glands; usually with few small bristles mostly at periphery, or non bristly; bristles to 0.5 mm long, glabrous or finely hairy.

Selected specimens: Northern Territory. Airstrip, Smith Point, 11°08'S, 132°09'E, Oct 1968, *Byrnes* 1084 & *Maconochie* (AD,NT); Smith Point, Cobourg Peninsula, about 140 km NE of Darwin, Apr 1977, *Pullen* 10617 (CANB,DNA); Darwin, Apr 1964, *Letts* (NT); ditto, Jun 1964, *Nelson* 1029 (BRI,NT).

Distribution and habitat: Known only from Cobourg Peninsula and Darwin, Northern Territory, but is common about Darwin (**Map 7**); occurs usually in sandy soil in lawns, old dunes and beach ridges.

Z. oligantha is characterised by the usually few-flowered, fragile inflorescences, prostrate slender stems; ovate, acute, thin leaflets; widely separated bracts and comparatively large flowers, and also by the small glabrous scarcely bristled or non bristly articles of fruits.

It is closely related to and resembles *Z. prostrata* S. Reyn. & Holland and *Z. cantonensis* Mohl. It differs from the former in the thin, ovate, acute leaflets with obscure nerves and pellucid dots, also in the few-flowered (up to 8(–12)-flowered) inflorescences and glabrous fruits with small articles. The leaflets in *Z. prostrata* are obtuse, prominently nerved and usually eglandular; the inflorescences are up to 21-flowered and fruits are hairy. From *Z. cantonensis* it differs in the 3- or 4- (or 5)-articulate, glabrous, scarcely bristled or non bristly fruits. In *Z. cantonensis* the fruits are 5–7-articulate, hairy and bristly.

Etymology: The specific epithet refers to the few-flowered inflorescences.

Imperfectly known taxa

Zornia sp. (1)

Herbs to 40 cm high with erect, glabrous, obscurely pellucid-dotted stems. Petioles 1.2–1.7 cm long; leaflets narrowly elliptic, 1.7–3.5 cm long, 1–2.5 mm wide, acute at apex, acute or obtuse at base, glabrous, conspicuously pellucid-dotted, usually drying blackish; petiolules to 1 mm long. Stipules narrowly elliptic, 6–8 × 1–1.5 mm, acuminate both ends, 5-nerved, pellucid-dotted; spur 1–1.5 mm long, acute. Inflorescences 3–12.5 cm long, 2–9-flowered, with separated bracts; peduncles 1.7–3.5 cm long; bracts narrowly elliptic, 7–10 × 2–2.5 mm, acute at both ends, 5-nerved, obscurely reticulate veined, pellucid-dotted; spur 1–2.5 mm, acute or acuminate. Calyx 3–4 mm; petals yellow with red lines; standard to 9 mm long. Fruits (2- or) 3- or 4-articulate; articles 2.5–3 × 1.7–2 mm, finely hairy, epunctate, covered with finely hairy bristles; bristles to 1 mm long.

Specimens examined: Queensland. COOK DISTRICT: 19 km S of Palmer River Crossing, Peninsula Development Rd, 1 km N of Cook shire boundary, 16°15'S, 144°43'E, Mar 1987, *Clarkson* 6642 & *McDonald* (BRI).

Distribution and habitat: Known only from the above collection from Queensland; occurs in woodlands among grasses.

Note: This specimen is not unlike an unnamed specimen at BRI from Papua New Guinea namely *Henty* (NGF14337) from Leron River, Morobe District (6°20'S, 146°25'E), Sep 1961, differing only in having fewer articles in the fruit (*Henty* has 5–7-articulate fruits). They are probably both closely related to *Z. papuensis* Mohl. which, according to the protologue description, differs from them in having glabrous, 5–7-articulate (as in *Henty*) fruits but with glabrous bristles.

***Zornia* sp. (2)**

Stems glabrous. Petioles 1.5 cm long; leaflets narrowly ovate, 2.7–4.5 cm long, 3–9 mm wide, acute and mucronate at apex, glabrous, sparsely pellucid-dotted, lower surfaces sparsely hairy; petiolules to 1.5 mm long. Stipules narrowly elliptic, *ca* 8 × 1.5 mm, acuminate at both ends, 5-nerved, sparsely pellucid-dotted with yellow dots; spur 2.5 mm long. Inflorescence 4.5–11.7 cm long, 9–20-flowered with bracts overlapping especially towards apex (internodes (0.5–)1.5–2.5 times as long as bracts); peduncles 1.3–4 cm long; bracts narrowly elliptic, 8–9 × *ca* 2 mm, acute at apex, with or without a small spur at base, 5-nerved, usually pellucid-dotted with yellow dots, sparsely hairy; spur to 1 mm long, obtuse. Standard 5–7 mm long. Fruits 4- or 5-articulate; articles subglobose, *ca* 2 × 1.5 mm, finely hairy, rarely with few small glands, bristly; reticulate venation fine, reddish coloured; bristles slender, same colour as the reticulate venation, to 1 mm long, finely hairy.

Specimen examined: Queensland. NORTH KENNEDY DISTRICT: King Ranch, Tully District, Mar 1979, Middleton [AQ330876] (BRD).

Distribution: Known only from the above collection.

This plant is a good match for plants from Brazil identified as *Z. latifolia* Smith and agrees quite well with Mohlenbrock's description of that species. Until more collections are available for study we cannot be certain of its identity. If the plant is *Z. latifolia* Smith, then it is probably an escape from cultivation.

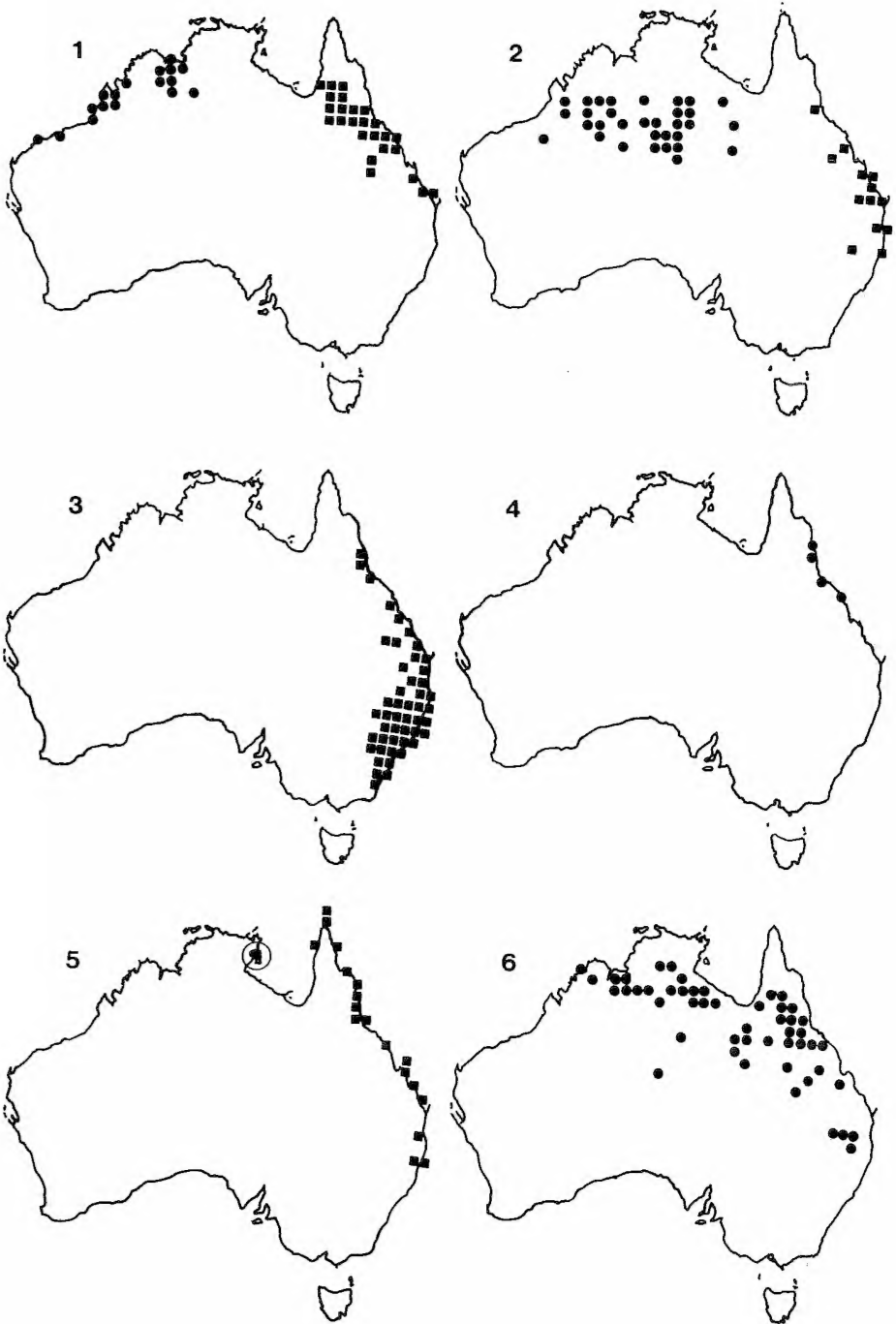
Acknowledgements

The authors are grateful to the Directors of the following herbaria (for the loan of their herbarium material and types) – AD, CANB, DNA, G, L, MEL, NT, PERTH and PR. They also extend their thanks to Les Pedley for the latin diagnoses, Rod Henderson for his comments on the manuscript, David Halford and Brian Hacker for their assistance and Dr Judy West for helping to search for the type of *Z. dyctiocarpa* DC. at K, BM, G.DC and G. The senior author also appreciates the financial support given by the Australian Biological Resources Study, Federal Department of The Arts, Sport, The Environment, Tourism and Territories.

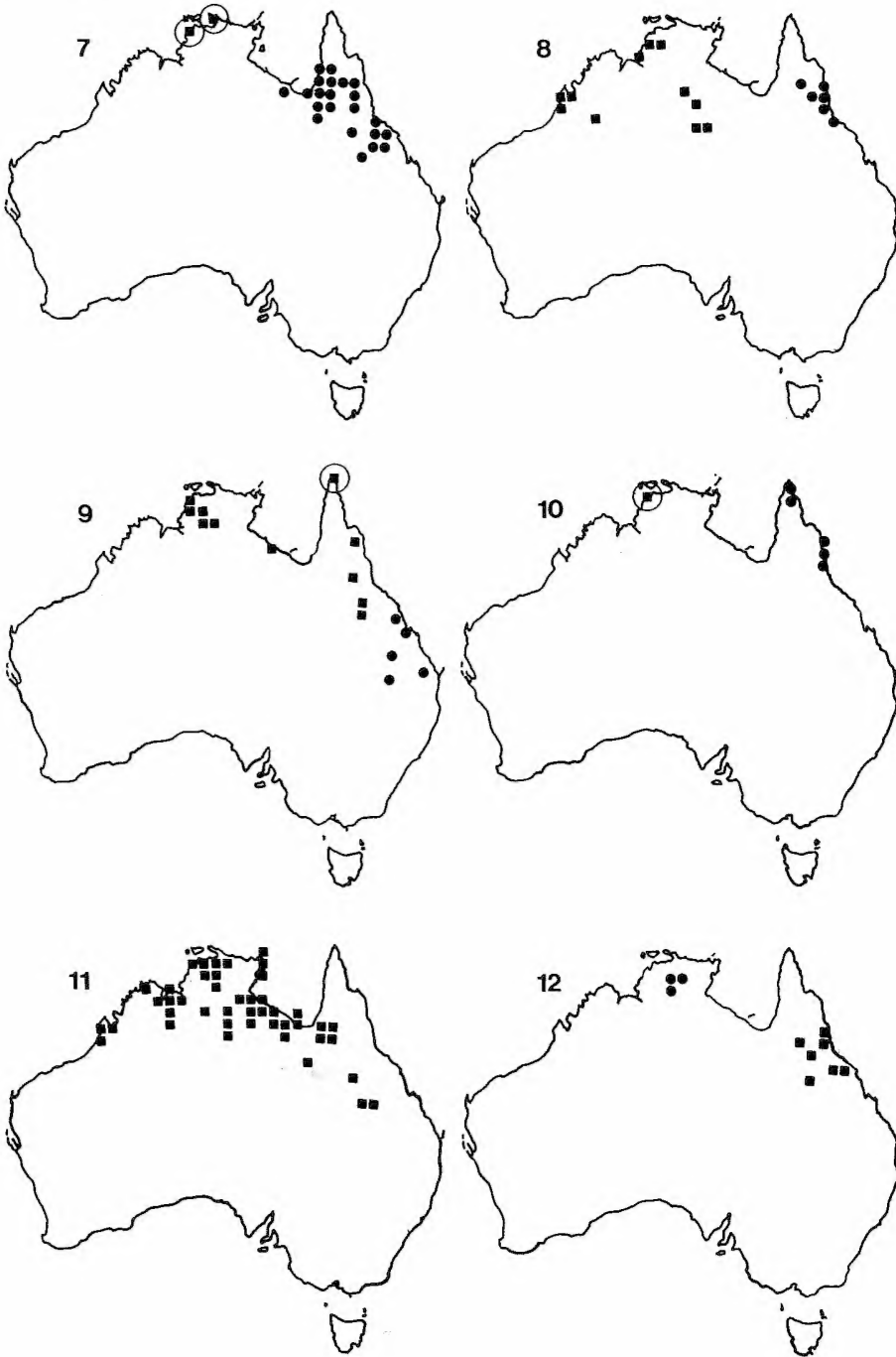
References

- BAILEY, F.M. (1913). *Comprehensive Catalogue of Queensland Plants*. Brisbane: Government Printer.
- BENTHAM, G.W. (1864). *Zornia*. *Flora Australiensis* 2: 228–229. London: Lovell Reeve & Co.
- DOMIN, K. (1962). *Zornia*. *Bibliotheca Botanica* 89: 208–211, t. 25.
- MILNE-REDHEAD, E. (1953–55). *Zornia* in Tropical Africa. *Boletum da Souldade Boteriana*, 27–29: 79–104.
- MOHLENBROCK, R.H. (1961). A monograph of the Leguminous genus *Zornia*. *Webbia* 16: 1–141.
- MOHLENBROCK, R.H. (1965). *Zornia*. *Journal of South African Botany* 31(2): 100–109.
- VAN MEEUWEN, M.S., NOOTEBOOM, H.P. & VAN STEENIS, C.G.G.S. (1961). Preliminary Revisions of some Genera of Malaysian Papilionaceae 1. *Reinwardtia* 5(4): 419–456.
- VERDCOURT, B. (1979). A manual of New Guinea Legumes: *Zornia*. Papua New Guinea, Department of Forests. *Botany Bulletin* 11: 375–380.

Accepted for publication 2 May 1989



Maps 1-6. 1. ■ *Z. muelleriana* subsp. *muelleriana*, ● *Z. muelleriana* subsp. *congesta*. 2. ■ *Z. floribunda*, ● *Z. albiflora*. 3. ■ *Z. dyctiocarpa* var. *dyctiocarpa*. 4. ● *Z. dyctiocarpa* var. *filifolia*. 5. ■ *Z. muriculata* subsp. *muriculata*. 6. ● *Z. muriculata* subsp. *angustata*.



Maps 7-12 7. ● *Z. adenophora*, ■ *Z. oligantha*. 8. ■ *Z. chaetophora*, ● *Z. stirlingii*. 9. ■ *Z. areolata*, ● *Z. pallida*. 10. ■ *Z. disticha*, ● *Z. maritima*. 11. ■ *Z. prostrata* var. *prostrata*. 12. ● *Z. prostrata* var. *macrantha*, ■ *Z. prostrata-muelleriana intermediates*.



Map 13. ▲ *Z. acuta*, ■ *Z. pedunculata*, ● *Z. ramosa*.